U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 112 (Revised).

A. C. TRUE, Director.

AGRICULTURAL EXPERIMENT STATIONS

IN

FOREIGN COUNTRIES.

BY

A. C. TRUE and DICK J. CROSBY.

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OFFICE OF EXPERIMENT STATIONS.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Office of Experiment Stations,
Washington, D. C., August 15, 1904.

Sir: I have the honor to transmit herewith a report on experiment stations in foreign countries, prepared under my direction by Mr. Dick J. Crosby with the assistance of Miss M. T. Spethmann. This is a revision of Bulletin No. 112 of this Office, and the changes made are based largely on information secured directly from the officers of the stations. There are also accounts of about seventy-five stations not included in the original bulletin. These changes and this additional information are of considerable importance, and I therefore recommend that the report be published as Bulletin No. 112 (revised) of this Office.

Respectfully,

A. C. True,
Director.

Hon. James Wilson,
Secretary of Agriculture.

CONTENTS.

KEY TO ABBREVIATIONS.

Actg., Acting.
Admin., Administrator.
Agr., Agriculture, Agriculturist, Agricultural.
Agron., Agronomy, Agronomic.
Agt., Agent.
Anat., Anatomy.
Assoc., Associate.
Asst., Assistant.
Bact., Bacteriology, Bacteriologist, Bacteriological.
Biol., Biology, Biologist, Biological.
Bot., Botany, Botanist, Botanical.
Chair., Chairman.
Chem., Chemist, Chemistry, Chemical.
Colon., Colonial.
Com., Commerce.
Comr., Commissioner.
Con., Conductor.
Corresp., Correspondent, Correspondence.
Cur., Curator.
Dept., Department.
Dir., Director.
Div., Division.
Econ., Economy, Economic, Economics.
Engin., Engineer, Engineering.
Engl., English.
Enol., Enologist.
Ent., Entomology, Entomologist.
Expt., Experiment, Experimental, Experimentalist, Experimenter.
Fert., Fertilizer.
For., Forestry.
Form., Foreman.
Gard., Garden, Gardener, Gardening.
Geol., Geology, Geologist, Geological.
Gov., Governor.
Govt., Government.
Hort., Horticulture, Horticulturist.
Husb., Husbandry, Husbandman.
Indus., Industrial, Industries, Industry.
Insp., Inspector.
Inst., Institute.
Instr., Instructor.
Invest., Investigations.
Irrig., Irrigation.
Lab., Laboratory.
Lect., Lecturer.
Libr., Library, Librarian.
Mach., Machinery.
Math., Mathematics.
Mech., Mechanics, Mechanical, Mechanician.
Met., Meteorology, Meteorologist.
Mgr., Manager.
Micros., Microscopy, Microscopist.
Min., Mines, Mining.
Minis., Minister.
Myc., Mycology, Mycologist.
Orch., Orchardist.
Path., Pathology, Pathologist.
Pharm., Pharmacy, Pharmacist.
Phys., Physics, Physicist, Physical.
Physiol., Physiology, Physiological, Physiologist.
Pract., Practical, Practice.
Pres., President.
Prin., Principal.
Reg., Registrar.
Sci., Science, Scientific.
Sec., Secretary.
Sta., Station.
Sten., Stenographer, Stenography.
Substa., Substation.
Supt., Superintendent.
Tech., Technology, Technical.
Treas., Treasurer.
Univ., University.
V.-Dir., Vice-Director.
Veg., Vegetable, Vegetation.
Vet., Veterinary, Veterinarian.
Vit., Viticulture, Viticulturist.
V.-Pres., Vice-President.
Zool., Zoology, Zoologist.
Zoot., Zootechny, Zootechnical.

INTRODUCTION.

This is a revision of Bulletin No. 112. As in the earlier bulletin, the following sources of information have been utilized: (1) Printed reports and bulletins of stations and departments of agriculture; (2) articles in the Experiment Station Record and numerous foreign journals, (3) reference books in the library of this Department, and (4) correspondence with directors of stations. Among the reference books the two most frequently used were *Mentzel und von Lengerke's landwirthschaftlicher Hülfs- und Schreib-Kalender* and *Congrès International des Stations Agronomiques, Paris*, by L. and H. Grandeau. Very satisfactory information regarding experiment stations in France was found in a recent article by L. Grandeau.[a] The printed statements made in the original bulletin regarding the different stations were sent to the directors of the stations for revision, and in this way most of the data have been verified.

As compared with the original bulletin, which listed about 720 experiment stations and similar institutions, this bulletin contains accounts of 798 such institutions arranged in alphabetical order by countries and cities. Among these, however, are included many institutions which for lack of further information are mentioned in the bulletin by title only, and a quite large number of experimental fields, laboratories, and other enterprises which in this country would not be called stations. Briefly stated, the list includes the various agencies of different kinds and grades for experiment and investigation in agriculture and for the protection and information of farmers. Purely as a matter of convenience these agencies are referred to collectively as "stations." As far as possible an attempt has been made to give an idea of the systems in the different countries, and this is followed by a description of the individual stations, their origin, personnel, equipment, revenue, and lines of work.

The revised bulletin demonstrates not only the world-wide extent of the station movement at the present time, but also the substantial growth of the movement during the past two years. Nearly every civilized country of the globe now has its system of institutions for

[a] Ann. Sci. Agron., 2. ser., 1902–3, I, No. 3, pp. 448–470.

research in agriculture. The most notable exception in Europe is Greece, where, so far as can be learned, there are no stations or similar agencies in operation. In Asia there are a goodly number of stations located in Russia, Japan, and British India. The Chinese Empire represents a large area which is entirely without stations, and the same condition applies to Turkey, Persia, Afghanistan, and Baluchistan. Africa has quite a large number of stations in the English, French, and German colonies, and several of these are of quite recent origin. There are no stations as yet in Mexico or in Central America, except in British Honduras, where a botanic garden is located; and of the South American countries no trace has been obtained of any stations in Bolivia, Colombia, Ecuador, Patagonia, Peru, Uruguay, or Venezuela. Australia and New Zealand have a large number of stations of various kinds, which are actively studying the practical problems suggested by the agriculture of those countries.

The largest number of separate agencies for investigation and experiment in agriculture is found in Russia, in spite of the fact that the movement is comparatively recent there. That country has 115 such establishments and 3 experimental forests. Many of them are small demonstration fields, established for the purpose of instructing the peasants or of introducing new agricultural industries; others serve as the centers for the production and distribution of improved varieties of seeds and plants, and some are conducted as institutions for research. There are a number of stations for special crops, such as tobacco, sugar beets, silk, cotton, olives, tea, wines, and other products.

The number of German stations listed is 87, which includes about a dozen control stations and laboratories for miscellaneous analyses, together with a number of stations for special industries. The only real bond of union between the German stations is the Association of Agricultural Experiment Stations in the German Empire, which was organized at Weimar in 1888 for the purpose of securing uniformity in methods for control work, and this does not include all of the stations.

The agricultural stations and laboratories of France, of which there are 74, are nearly all under the general direction of an inspector-general, an officer of the Ministry of Agriculture. Prof. L. Grandeau has held this position since its creation in 1882.

Austria has 40 stations, about one-third of which are of the grade of the control station. These are under the general control of the Ministry of Agriculture, which also issues an official publication containing reports and papers on various phases of the station work.

In Great Britain it is difficult to determine what should be listed as stations, as many of the institutions were not established primarily for agricultural experimentation, but have been subsidized by the Board

of Agriculture for that purpose, or have taken up a certain amount of work which has an incidental bearing on research. In the British Islands there are about 32 agencies, including 9 institutions that may be regarded as stations, 16 institutions which are subsidized by the Board of Agriculture, and 7 botanic gardens. In India there are 12 experimental farms and plantations, and 26 botanic and municipal gardens, besides a number of other agencies for the benefit of agriculture. An endowment fund of $150,000 has recently been given for the establishment of an Imperial Agricultural College and Experiment Station at Pusa, Bengal.

Belgium has a system of 16 stations, 10 of which are analytical and chemical laboratories, all under the supervision of the Belgian Bureau of Agriculture. Hungary has 22 stations, under the supervision of of the Central Commission of Experiment Stations, which provides an organ for the publication of their work, and Italy has 25 stations and laboratories which receive a portion of their appropriation from the Government, many of them also receiving funds from the province or municipality in which they are located and from local agricultural associations and chambers of commerce.

A feature of the system in Australia, which includes 35 institutions, is the State farms. There are 16 of these scattered over the country, which are devoted for the most part to cultural and similar experiments, demonstrations of good farming, the improvement of live stock, and similar work.

In the Netherlands there are 7 stations, including a seed control station and a laboratory of vegetable pathology, besides a system of 11 government demonstration fields, 10 dairy experiments under local dairy instructors, and 20 subsidized demonstration fields conducted under the auspices of local agricultural and horticultural societies.

Sweden has 26 stations controlled and partially supported by the State Department of Agriculture, most of which are chemical and seed control stations. In addition there are 10 agricultural chemical stations maintained by societies which are in reality laboratories for analysis and control. Norway has 12 stations, including several control stations, all of which, with one or two exceptions, are under the direct control of the Department of Agriculture, and Denmark has 10 stations, several of which are among the most liberally supported of the European stations.

In Japan there are 58, including 3 branch stations and 39 prefectorial stations; in Switzerland a system of 11 stations, all under the control of the Department of Agriculture, except 1 for brewing, and in Spain 8 stations, 5 of which are enological and viticultural and 1 for sericulture.

These comprise the principal countries in which experiment stations and similar agencies are most active, with the exception of Canada and

the United States. The full list, however, includes Algeria, Argentina, Bosnia and Herzegovina, Bulgaria, Brazil, Cuba, Egypt, Java, Portugal, Roumania, and many minor countries and dependencies.

A comparison of foreign and American experiment stations makes it apparent that the latter represent a distinct class of institutions, which are the product of their environment. The exact prototypes or counterparts of the American stations are not found in any other country, either in scope, organization, and management, or in relation to the farming community and the promotion of agriculture in general. The American station is an adaptation of the European station to the conditions and requirements of this country, and thus presents many unique features.

The various agencies for agricultural experimentation and research in foreign countries may be classified in a general way under six heads: (1) Experiment stations proper; (2) special stations for particular crops or agricultural industries; (3) control stations and agricultural laboratories; (4) botanic stations and gardens; (5) experiment farms and demonstration fields, and (6) agencies for local or cooperative experiments.

Among those of the first class there are but few which correspond to the American stations in the breadth of their work and in their organization. To a large extent these stations have developed in the direction of some particular branch of agriculture, as agronomy, animal production, or dairying, although their field of operations is broader than that of the special stations. As a rule they are dominated by the influence of a single man, who is usually the director, and their energies are bent toward the development of his theories of plant nutrition, or some phase of animal nutrition, or the like. With a few notable exceptions the individual stations do not each embrace strong departments in plant production, the feeding of animals, injurious insects and diseases, with experts in these several lines. Indeed, where these different branches are found working side by side they are usually broken up into as many separate stations, each with its own director. This is partly a matter of finances and largely of custom. The union of a number of departments in a single station seems opposed to the ruling system in Europe, and certainly, as far as advanced work goes, the European plan has much to commend it.

The special stations are devoted to such subjects as tobacco, flax, and cotton culture, moor culture, forestry, viticulture, wine making, brewing and distilling industries, milling, sugar and starch industries, indigo, sericulture, butter and cheese making, etc. A number of these special stations are found in Austria, France, Germany, Italy, Russia, Spain, and Switzerland. In some cases they are partially supported by Government appropriations, while in others they are entirely under the control and maintenance of local organizations.

The work of the control stations is generally understood. Many of these undertake no investigations, but confine themselves to the examination of fertilizers, seeds, feeding stuffs, etc. The agricultural laboratories differ from the control stations in being established primarily for the convenience of farmers who desire analyses made. They frequently have no regular control duties. Systems of such agricultural laboratories are maintained in Belgium, France, Italy, and Sweden.

The botanic stations and gardens, while frequently not established for the direct benefit of agriculture, render considerable incidental aid in the introduction and acclimatization of plants, distribution of seeds, etc., and a considerable number of them have experimental fields connected with them, so that they have developed into stations comparable with many of the experiment stations. In Great Britain and France the botanic gardens constitute one of the features of the experiment station system. The Royal Gardens at Kew, London, have connected or in cooperation with them a system of 106 botanic gardens and stations distributed through Great Britain and its colonies. In a similar way there are affiliated with the Colonial Garden at Vincennes, France, a system of 15 gardens and stations located in the various French dependencies. In many instances these gardens and stations constitute the only agencies which have been provided in the newer countries, and their work is varied and of considerable importance to agricultural development.

Experiment farms and demonstration fields are numerous in Australia, New Zealand, India, the Netherlands, and Russia. In a number of countries where the station movement is new these farms and fields represent the initial step in agricultural experimentation. For instance, in Bosnia and Herzegovina, in Brazil, Bulgaria, and Paraguay, a beginning has been made by the establishment of a few experimental farms or fields, which for the most part are for the purpose of conducting cultural and demonstration experiments.

Among the agencies for local and cooperative experiments various agricultural societies and organizations are prominent which, through their efforts alone or with the assistance of Government funds, provide for local trials or cooperative experiments of a simple order. Many such experiments are carried on by agricultural and horticultural societies in the Netherlands, by the county councils in England, and by the Department of Agriculture in Ireland.

The most extensive series of cooperative experiments of which record has been found—and they do not belong to the class mentioned above—are those in feeding dairy cows in Denmark, which were begun by Prof. N. J. Fjord in 1872 and are still being carried on by the laboratory of the Royal Veterinary and Agricultural College at Copenhagen. The same institution also has charge of the butter exhibitions, which

in a sense are cooperative. These exhibitions entail an annual expenditure of about $10,700, but they have been instrumental in improving the average quality of the butter and developing a large export trade.

The systems of management and sources of revenue of the foreign stations present a great variety of conditions. In the majority of the countries there is a central directing or supervising agency by which the Government funds are administered. This system of central control prevails to a considerable extent in Austria, Belgium, Bosnia and Herzegovina, British West Indies, France, Hungary, Norway, Sweden, and Switzerland. In these countries the administrative agencies are the state departments or ministries of agriculture. In parts of Australia, notably in New South Wales and in New Zealand, this system also prevails. In Denmark the Government directs many of the agencies for the promotion of agriculture through the Royal Danish Agricultural Society. In Holland the stations are under the general management of a committee appointed by the Crown, and in Russia the stations are partly under the supervision of the Ministry of Agriculture and Domains. In Great Britain there can not be said to be any centralizing authority further than that exerted by the Board of Agriculture, which distributes grants, and the Royal Gardens at Kew. In Germany there is no central authority for the stations in the whole empire. The Prussian stations are affiliated with the Ministry of Agriculture, Domains, and Forestry, but there can not be said to exist in Germany any central administrative authority in the sense in which there is in France, Belgium, Hungary, and other countries.

Taken as a whole, the foreign experiment stations are working in the main independently of one another, there being very little cooperation between the stations of any country or with the central department of agriculture. Such cooperation, which is becoming more extensive in this country each year, may be regarded as one of the characteristic features of the American system.

The information obtained regarding the revenue of the foreign stations is quite fragmentary. A large number of the stations have no fixed or separate revenue. Many of them are operated in connection with other institutions, while others are maintained jointly by government and local appropriations, together with fees for analysis, some agricultural society supplying any deficit which may occur. In most of the control stations and laboratories small fees are charged, and in many cases these constitute quite a large proportion of the revenue of the station.

In a large number of instances the total income reported amounts to only a few hundred dollars, but in such cases the station or laboratory is usually connected with some other institution which probably pays the salaries of the employees. On the other hand some of the more liberal incomes reported include the funds available for the use of both the station and the college with which it is connected. This

is notably true in Great Britain, Australia, and Canada. However, the Central Experimental Farm in Canada is an exception, and it has an income of over $40,000 a year.

The Austrian stations are, as a rule, quite liberally supported, the Vienna Station receiving over $28,500 in 1902, and the forestry institute at Mariabrunn $15,000. The average income of the Austrian stations is about $4,800. In Denmark the average income of the stations is over $14,000. The three moor stations of that country have a total income of over $100,000. The moor station at Bremen, Germany, received nearly $18,000 in 1902, and the Swedish Moor Association Station nearly $13,500.

The French system of stations includes many small, poorly financed laboratories, and the average income is thus cut down to less than $2,000. The largest income, $8,975, is that for the Laboratory for Technical Tests, at Marseille. The condition of the German stations is much better financially, the average income for the stations reporting their receipts being over $10,000. The Institute for Fermentation Industries and Starch Manufacture, Berlin, received over $228,000 in 1902, the Leipzig Agricultural Institute over $20,000 in 1902, the Halle Station over $33,000 in 1903, the Münster Station over $22,000, the Kiel Station nearly $22,000, and the Darmstadt Station over $19,000.

The average income of the Hungarian stations is a little over $4,000, with a maximum of $11,800; of the stations in India, $5,600; in Italy, $3,700, and in Japan, $7,000. The budget of the central station near Tokyo and its three branches, for the fiscal year 1904, is nearly $92,000. The stations in Java have liberal funds, the east and west Java sugar stations receiving $26,000 and $24,000, respectively, and the indigo station $6,566. The average income of the stations in Norway is but little over $2,000; of those in Sweden, a little over $3,000; of those in Russia, a little over $2,000. Sweden has a seed breeding laboratory which receives $14,000 a year, and Russia a silk culture station with an annual income of over $23,000. The income of eight of the Swiss stations averages about $8,000.

While a number of the foreign stations receive as high as $15,000 a year from various sources, an income of over $5,000 a year is rather the exception than the rule for these stations, and there are large numbers whose incomes amount to only $2,000 or $3,000. These stations, however, are usually at no expense for buildings or for printing, the publication of their work in periodicals often being a small source of revenue, and as their fields are quite restricted in area the expense for labor is reduced to a minimum. By the exercise of rigid economy and by confining their efforts to a few specific lines of work many of these stations have accomplished a surprising amount of high-grade work, which has contributed materially to the general sum of human knowledge in the field of agricultural science.

AGRICULTURAL EXPERIMENT STATIONS IN FOREIGN COUNTRIES.[a]

ALGERIA.

Agricultural and Enological Station, Algiers.

Station staff.—J. Dugast, *Dir.;* two assistants; a laboratory helper.

Origin.—Founded in 1889. The enological laboratory was added in 1896.

Equipment.—An analytical and research laboratory, an enological laboratory with fermentation room, experimental field, and experimental cellar.

Income.—For 1900, $3,338.90 (State, $1,273.80; department, $2,065.10).

Lines of work.—Analysis of fertilizers, soils, feeding stuffs, etc.; research work in connection with the production of grapes and olives.

Botanic Experiment Station, Rouïba.

Station staff.—Dr. L. Trabut, *Dir. and Gort. Bot.*

Origin.—The experimental work has developed gradually from Doctor Trabut's work in charge of the Government Botanic Garden.

Equipment.—Botanic garden, farm buildings, and experiment fields containing 39 acres.

Income.—The State makes small appropriations for the botanic garden, but no provision for seed and plant introduction or experimental work, the former being accomplished by exchange, the latter through Doctor Trabut's personal efforts.

Lines of work.—Trials with native and introduced fruits, including plums, strawberries, apricots, olives, figs, loquats, and oranges; experiments with garden vegetables; testing and distributing native and introduced forage plants, especially legumes and drought and alkali-resisting plants; experiments with varieties of wheat and with agaves and opuntias for the purpose of utilizing waste land; tobacco culture; vine growing.

[a] This list includes agricultural experiment stations and other institutions in connection with which investigations relating to agriculture are conducted.

Experiment Garden, Sétif.

Staff.—Ryf, *Mgr.*

Origin.—Mr. Ryf maintains and controls the trial grounds, and a local society, the Geneva Agricultural and Viticultural Society, cooperates in the work to the extent of publishing reports. Other similar gardens, some of them entirely maintained by local agricultural and viticultural societies, have been established at Clemsen (G. Soiptur), Oran (Vermail, *Agr. of Dept.*), Batria (John Wild), Constantine (Paul Pousselot, *Agr. of Dept.*), and other places in Algeria.

Lines of work.—Demonstration experiments in the culture of alfalfa, sulla, and varieties of wheat; investigation of agricultural problems for semiarid regions. Mr. Ryf is conducting a very promising experiment with an alfalfa and wheat rotation in which cultivation during a part of each year is an important factor.

ARGENTINA.

Office of Agronomy and Animal Husbandry, La Plata.

Governing board.—Ministry of Public Works.

Station staff.—Ramón Pieres, *Dir.;* Carlos Lemée, *Sec.;* Dr. Carlos Spegazzini, *Bot.;* Juan A. Ortiz, *Ent.;* Ricardo J. Davel, *Chem.;* Julio J. Bolla, *Lab. Asst.;* Manual V. Casal, *Bact.;* Pedro J. Issouribehere, *Traveling Insp.;* Damian del Castillo, *Supt. Baradero Agr. Sta.;* Juan Ramón Chaves, *Supt. Chivilcoy Agr. Sta.*

Origin.—Established in accordance with the provisions of the law of September 15, 1892.

Lines of work.—Analysis of soils, waters, feeding stuffs, fertilizers, etc.; study and classification of wild pasture grasses and cultivated plants; study of diseases of plants and domestic animals and of means for combating them; destruction of noxious insects and propagation of useful insects. Outlying stations are maintained at Baradero and Chivilcoy, where meteorological records are kept and field experiments conducted.

AUSTRALIA.

NEW SOUTH WALES.

The New South Wales Department of Mines and Agriculture, Sydney.

Hon. John Kidd, *Sec. of Min. and Agr.;* E. F. Pittman, *Under Sec. of Min. and Agr.;* experts in the different branches of agriculture.

The New South Wales Department of Mines and Agriculture was organized in 1890 and has its headquarters in Sydney, where well-equipped laboratories are provided for the use of members of the staff. As an administrative body it has the management of the Hawkesbury Agricultural College and Experimental Farm at Richmond and the agri-

cultural schools and experimental farms located in different parts of the colony. A staff of experts and inspectors and their assistants, comprising at present about 30 members, are engaged in research, control, and editorial work. The principal lines of research conducted at Sydney are in chemistry, bacteriology, vegetable pathology, entomology, viticulture, dairying, and fruit culture. The experts and inspectors also visit all parts of the colony, giving instruction, investigating the work of the institutions under their control, and enforcing inspection laws. The department and its farms are maintained by an annual vote of Parliament, which is generally about $219,000 per annum. The department subsidizes agricultural societies and offers prizes for the manufacture of butter. For the dissemination of information among the agriculturists of the colony the department publishes the *Agricultural Gazette*, a monthly farm journal which is issued free of cost to the agricultural societies of the colony and to any farmer having 4 acres under cultivation who makes application to the department. Reprints in pamphlet form of the articles of special interest are distributed freely among the farmers.

The Hawkesbury Agricultural College and Experimental Farm, Richmond.

Governing board.—Department of Mines and Agriculture.

Station staff.—H. W. Potts, *Prin.;* C. Potts, *Lect. in Chem. and Phys.;* C. T. Musson, *Engl. and Sci. Master;* S. C. Pottie, *Lect. in Vet. Sci.;* A. Hawkesworth, *Sheep and Wool Expert;* D. S. Thompson, *Poultry Expert and Apiarist;* George Cobb, *Farm Form.;* P. H. Suter, *Dairy Instr.;* J. Alford, *Orch.;* S. F. Adams, *Reg.;* G. L. Sutton, *Expt.;* a number of assistants and other officers.

Origin.—The college was opened in 1891, and experiments were begun the same year. Separate accounts are kept of the cost of instruction and of experimental work.

Equipment.—Chemical building containing two laboratories, balance room, and office; other laboratories in the main college building; about 500 sheep and other farm animals; a farm of 3,500 acres, 1,100 acres of which are under cultivation, and about 200 acres in experimental plats; a vineyard of 8 acres, and an orchard.

Income.—Annual grants of about $35,000 from the Department of Mines and Agriculture; receipts from students' fees and from the sale of farm products of about $19,000.

Lines of work.—Cultural and manurial experiments with cereals, forage crops, root crops, fiber plants, and garden vegetables; variety tests and other experiments with grapes, oranges, peaches, and other fruits; dairy, poultry, and bacteriological investigations, and stock feeding. Special attention is given to macaroni wheats and to the developing of new varieties of wheat in the hope of obtaining a good

milling variety that will be highly rust resistant. The college distributes seeds and fodder plants among the farmers of the colony.

State Farms.

Wagga Experimental Farm, Wagga-Wagga.

G. M. McKeown, *Mgr.*, *Expt.;* Stuart A. Hogg, *Orch.;* L. McDonald, *Reg.*

This farm was established in 1892 and consists of 3,300 acres, of which 1,100 acres are under cultivation. Substantial farm buildings and students' quarters have been erected and an orchard of 82 acres set out which contains about 2,000 varieties of fruit, including apples, pears, apricots, peaches, figs, raisins, grapes, and currants. The farm supports about 1,000 sheep, 47 horses, 64 cattle, 30 pigs, and a large number of fowls. It is practically self-supporting. The lines of work include experiments in the cultivation of wheat and other cereals, experiments with manures and various methods of culture, chemical and bacteriological investigations, experiments in developing new wheats with better milling qualities and with greater resistance to rust and drought, tests of fodders and grasses and of many kinds of fruits, experiments in drying and canning fruit and in the manufacture of olive oil, and practical instruction to students in the various branches of farm work.

Experimental Farm, Bathurst.

Governing board.—The manager (Mr. R. W. Peacock), under the direction of the Minister of Mines and Agriculture.

Station staff.—R. W. Peacock, *Mgr.;* G. Marks, *Expt.;* E. K. Wolstenholme, *Orch.*

Origin.—Founded in 1895 by the government of New South Wales.

Equipment.—Farm of 614 acres, of which about 400 acres are under cultivation and 30 acres in orchard; farm buildings.

Income.—For 1901–2, $6,114.35 (students' fees, $577.90; farm sales, $5,536.45).

Lines of work.—Experiments in method of culture; tests of various field crops, fodders, and fruits; development of new drought-resisting wheats, and the improvement of the soil by grazing, principally with sheep. Instruction in farming is given to about 15 resident students.

Experimental Farm, Wollongbar.

Station staff.—C. H. Gorman, *Mgr.;* I. I. Kinross, *Dairy Instr.*

The farm has an area of 263½ acres and is typical of the "Big Scrub" country of the Richmond River. It is located 8 miles from the important town of Lismore, which is the distributing center of the most important dairying district of the State. Students are taken for

yearly courses in practical work only. The principal work of the institution is dairying, stock raising, and the cultivation of tropical and subtropical products and fodder crops.

Irrigation Experimental Field, Pera Bore.

——— ———, *Mgr.*

This farm has been located in one of the dry western districts to demonstrate the value of irrigation by means of artesian wells. The principal experiments are with fodders, vegetables, and fruits.

Experimental Farm, Coolabah.

R. W. Peacock, *Mgr.*

The Coolabah farm was established in 1898 to investigate means for reclaiming western barrens, and the principal experiments conducted have been with drought-resisting cereals, grasses, and indigenous fodder plants.

Dairy Stud Farm, Berry.

Established in 1900 to promote dairy farming, cattle breeding, rearing, and management, and to give instruction to students along these lines.

Belindigarbar Experimental Farm, Grafton.

J. A. Bulkeley, *Mgr.*

This farm was established in the autumn of 1901, and comprises an area of 2,069 acres, located 6 miles from Grafton. Experiments with grasses and other forage crops have been undertaken with a view of establishing the dairy industry on the north coast, and an effort will be made to introduce mutton growing by breeding up a strain of sheep that will be immune to prevalent diseases, such as foot rot and flukes.

Viticultural Station, Howlong.

Station staff.—In charge of M. Blunno, *Vit. Expert of the Dept. of Agr.*

Origin.—Established in 1901 by the Department of Mines and Agriculture.

Equipment.—Vineyard of 30 acres.

Income.—Supported by the Department of Mines and Agriculture.

Lines of work.—Propagation, cultivation, and distribution of phylloxera-resistant vines.

Irrigation Farm, Moree.

B. L. Thompson, *Mgr.*

Established in 1900 under the supervision of W. S. Campbell. The farm consists of 250 acres. Of the 50 acres under cultivation, 4 acres

have been planted to orchards. The lines of work include the growing of fruits, nuts, cereals, and forage crops under irrigation from wells.

Botanic Gardens and Domains, Sydney.[a]

Governing board.—The director is responsible to the chief secretary of New South Wales.

Staff.—J. H. Maiden, *Dir. and Govt. Bot.;* G. Harwood, *Supt. Bot. Gard.;* E. Betche, *Asst. Bot.;* Miss S. Hynes, *Asst. Bot.;* J. Jones, *Overseer of Domains;* J. H. Camfield, *Overseer Garden Palace Grounds;* W. Forsyth, *Overseer Centennial Park;* J. McEwen, *Supt. State Nursery* (Campbelltown). Fifty-two gardeners; 26 laborers; 4 artisans; 6 rangers; 13 clerks; messengers, etc.

In his capacity as government botanist the director is adviser to the Department of Agriculture and to the Forest Department.

Origin.—The Domains have been a public reserve almost since the foundation of New South Wales in 1788; a garden was set apart for the use of the settlement and for the requirements of the governor before 1800; an officer was formally appointed colonial botanist and superintendent of botanical gardens in 1828. The Centennial Park was established in 1888 to commemorate the centenary of the colony.

Equipment.—Botanic Gardens, 45 acres; Domains, 125 acres; Garden Palace Grounds, 21 acres; Centennial Park, 823 acres; State Nursery, 20 acres. The Botanic Gardens contain a handsome building for administrative offices, for herbarium, library, museum, seed rooms, etc., which cost about $48,665; also 7 hothouses and the usual appliances for carrying on the work of a first-class botanic garden. The Domains and Centennial Park are public parks, and in the State Nursery plants are propagated for the Botanic Gardens and also for distribution to public bodies throughout the State. The Garden Palace Grounds form an integral portion of the Botanic Gardens, although the arrangement of them is more on the lines of a public park, and the plants are, as a rule, not labeled.

Income.—Entirely supported by the State. In 1901–2 the Botanic Gardens received $40,718; Domains, $15,694; Garden Palace Grounds, $6,623; Centennial Park, $22,220; State Nursery, $4,745; total, $90,000.

Lines of work.—Introduction of useful and ornamental plants and experimental investigations. In the National Herbarium especial attention is given to the Australian flora, although exotic plants are very creditably represented. Exchanges are conducted with a large number of institutions in various parts of the world. The director is at present engaged on a critical revision of the national genus Eucalyptus and in the preparation of an illustrated forest flora of New South Wales.

[a] Includes Botanic Gardens and National Herbarium; Domains; Centennial Park.

Technological Museum, Sydney.[a]

Governing board.—Under the administration of the Department of Public Instruction.

Staff.—R. T. Baker, *Cur. and Econ. Bot.;* H. G. Smith, *Organ. Chem.;* S. J. Johnston, *Econ. Zool.;* W. Bauerlen, *Bot. Collector.*

Origin.—Founded in 1880 as a branch of the Australian Museum.

Equipment.—Three well-equipped laboratories (botanical, chemical, and zoological) besides the large museum, with a floor space of about 9,000 square feet on each of five floors, and consisting of commercial exhibits of the vegetable, mineral, and animal kingdoms.

Income.—For 1902, $15,937.80.

Lines of work.—Investigation of the natural resources of the vegetable, mineral, and animal kingdoms of the State of New South Wales.

QUEENSLAND.

The Queensland Department of Agriculture, Brisbane.

W. Chas. Green, *Sec. of Agr.;* Ernest G. E. Scriven, *Under Sec. of Agr.;* P. McLean, *Agr. Adviser.*

The Queensland Department of Agriculture, which was organized in 1887 and made a separate administrative department in 1896, has direct control of the Queensland Agricultural College, of the Botanic Gardens at Brisbane, and of the seven State experimental farms. It is charged with the dissemination of information likely to be of value to the farmers of the colony, and for this purpose publishes the *Queensland Agricultural Journal*, which "is issued gratis to persons whose main sources of income are from pastoral, agricultural, or horticultural pursuits." The department subsidizes agricultural societies, and also offers certain departmental prizes on agricultural products, the prizes being awarded at shows of the societies. The departmental staff of experts and inspectors, comprising about 15 members, is engaged in agricultural research work; the inspection of fruit, live stock, etc., in different parts of the colony, and the instruction of farmers on their plantations. Annual conferences of farmers, at which the departmental experts are in attendance, are convened by the Department of Agriculture, and reports of the proceedings of these conferences are published.

Botanic Gardens, Brisbane.[a]

Governing board.—Under control of the Minister of Agriculture.

Staff.—Philip MacMahon, *Dir.*

Origin.—Founded by the State in 1828.

Income.—A parliamentary vote averaging $11,193 per annum.

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[a] See Royal Gardens, Kew, p. 161.

Lines of work.—The collection of plants of interest horticulturally and botanically, the dissemination of information in economic botany, horticulture, and forestry, and the maintenance of the gardens as a place of public resort and an object lesson in the above. The collection of tropical plants is very extensive and of great interest.

Acclimatization Society, Brisbane.[a]

Governing board.—Governed by a council of 15 members, elected by the society.

Staff.—Edw. Grimley, *Sec.;* J. Mitchell, *Overseer.*

Origin.—Founded August 14, 1882, mainly by L. A. Bernays, the first secretary.

Equipment.—Seventeen acres of land at Bowen Park, Brisbane; 3 glass houses.

Income.—1901–2, $6,830.

Lines of work.—Originally the acclimatization of animals and plants; now the acclimatization and improvement of plants only.

Botanic Department, Brisbane.[a]

F. M. Bailey, *Colonial Bot.*

Bureau of Sugar Experiment Stations, Bundaberg.

Staff.—Walter Maxwell, *Dir.;* Arthur J. Gibson, *First Asst. Chem.;* J. C. Penny, *Chem. Insp. of Sugar Mills.*

The Bureau of Sugar Experiment Stations is a bureau of the Queensland Department of Agriculture, organized November 1, 1900, in accordance with the provisions of "The Sugar Experiment Stations Act of 1900." Laboratories for analytical chemical work and the other technical operations of the bureau have been erected at Bundaberg, the headquarters of the bureau. The work at this place consists of the analysis of soils, irrigation waters, fertilizers, sugar canes and their products, and other miscellaneous material. The income of the bureau for the year ended June 30, 1903, was $26,125 (assessments received on cane crushed, $12,994.42; endowment from consolidated revenue, $12,994.42; miscellaneous, $136.16).

The Central Experiment Station at Mackay has been placed under the control of the bureau, and at this place, in addition to the laboratory work, field experiments are conducted. A large part of the field work, however, is conducted at so-called substations, which in reality are experiments carried on in cooperation with farmers. At the present time there are fourteen such substations.

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[a] See Royal Gardens, Kew, p. 161.

Agricultural College and Experiment Farm, Gatton.

Governing board.—Department of Agriculture.

Station staff.—J. Mahon, *Prin.;* P. M. Pitt, *Sec. and Libr.;* F. H. Gurney, *Chem. and Sci. Master;* D. Macpherson, *Farm Form.;* C. McGrath, *Supt. of Dairy;* A. Watt, *Chief Steward.*

Origin.—Opened in 1897 and equipped at a total cost to date of about $160,000 for farm, buildings, and improvements.

Equipment.—Chemical laboratory and other college buildings, and farm of 1,692 acres.

Income.—Annual grants from the Department of Agriculture amounting to about $29,200 per annum.

Lines of work.—Analysis of soils, manures, and feeding stuffs; field experiments with grasses, clovers, and wheat; special experiments in the cultivation of tobacco and other crops, and in utilizing barnyard manure. Quite extensive variety tests with wheat and potatoes, and cross-fertilization experiments with wheat have been undertaken.

State Farms.

Biggenden Farm, Biggenden, Burnett District.

Governing board.—Under the control of the Minister of Agriculture.

Staff.—G. B. Brooks, *Mgr.*

Origin.—Established in 1899 at a cost of $7,580.

Equipment.—Residence, stables, piggeries, implement and hay sheds, meteorological apparatus, apiary, farm of about 100 acres.

Income.—For 1902–3, $1,688.15.

Lines of work.—Field experiments in the growth of cereals, root crops, and grasses; vineyard and orchard work.

Kamerunga State Nursery, Cairns.

Governing board.—Under the control of the Minister of Agriculture.

Staff.—Howard Newport, *Instr. in Coffee Culture, Mgr.;* J. G. Malcolm, *Overseer.*

Origin.—Founded in 1888.

Equipment.—Greenhouses (one provided with vegetation pots); steam pump and irrigation plant; office buildings; potting houses, etc.; farm of 316 acres, of which 15 acres are devoted to experiments.

Income.—For 1902–3, $3,181.71 from the State.

Lines of work.—Acclimatization, propagation, and distribution of economic tropical plants, etc. Experiments in utilization of indigenous economic products. Special experiments with rubbers, spices, fibers, food stuffs, fodders, tropical fruits and vegetables, oils, etc.

Gindie Farm, Central District.

R. Jarrott, *Mgr.*

Established in February, 1898, at a cost of $13,656 for the first two years; farm of 8,000 acres, farm buildings, and machinery; sheep and stock raising and experiments with wheat and other cereals. In 1902–3 the income amounted to $2,413.

Hermitage Farm, Warwick, Darling Downs District.

Governing board.—Under the control of the Minister of Agriculture.

Staff.—H. C. Quodling, *Mgr.*

Origin.—Established in March, 1897.

Equipment.—Farm of 440 acres, of which 22 acres are devoted to orchard and vineyard.

Income.—For 1902–3, $4,247.45.

Lines of work.—Experiments with orchard fruits to test the commercial value of different varieties; similar experiments with grapes; breeding experiments with wheat; field tests of approved types of wheat, and propagation of the same for supply of pure seed; experiments with fertilizers for wheat; tests of varieties of farm and garden seeds; growing of fodder plants and grasses.

Central Experiment Station, Mackay.

H. T. Easterby, *Asst. Dir. in Charge.*

First established in 1888 as a nursery for growing tropical fruits, but recently converted into a sugar experiment station and placed under the control of the newly established Bureau of Sugar Experiment Stations. The equipment includes a well-equipped chemical laboratory and farm of 20 acres, which have cost the department about $42,000 and have yielded about $2,000. The principal lines of work are testing and distributing among planters new varieties of sugar cane and sorghum, and such tropical fruits as pineapples, oranges, and grapes, and other tropical productions. An agricultural school is conducted at the Mackay institution.

Westbrook Farm, Westbrock, Darling Downs District.

Staff.—C. Ross, *Mgr.;* four assistants.

Origin.—Established in March, 1897.

Income.—For 1902–3, $4,091.47.

Lines of work.—Experiments with cereals and root crops and feeding experiments for dairy purposes.

Acclimatization Society's Gardens, Rockhampton.[a]

J. S. Edgar, *Supt.*

SOUTH AUSTRALIA.

The South Australia Agricultural Bureau, Adelaide.

R. Butler, *Minis. of Agr.;* A. J. Perkins, *Sec. Agr. and Editor Journal of Agriculture;* W. L. Summers, *Subeditor and Insp. of Fert.;* G. Quinn, *Hort. Instr.*

The bureau was established in 1888 and consists of more than 100 branch bureaus situated in different parts of the country, through which much of the experimental work is carried on. The Minister of Agriculture issues annual reports, and the bureau publishes the *Journal of Agriculture*, a monthly farm journal, which is distributed gratis to members of branch bureaus. The bureau is engaged in promoting the improvement of agricultural operations by bringing together for purposes of discussion leading agriculturists in different districts. Among other lines of work undertaken by the bureau may be mentioned the introduction of improved varieties of wheat and other cereals and of pure-bred stock; investigations in dairying, irrigation, horticulture, and viticulture; and attempts to lessen the ravages of fungus diseases and of animal pests, such as rabbits, foxes, sparrows, and starlings.

Botanic Garden, Adelaide.[a]

Maurice Holtze, *Dir.*

Botanic Garden, Port Darwin.[a]

Nicholas Holtze, *Cur.*

Agricultural College and Experimental Farm, Roseworthy.

Governing board.—Under the direct control of the Minister of Agriculture.

Station staff.— ——— ———, *Prin.;* and the scientific members of the Agricultural Bureau.

Origin.—Founded in 1883.

Equipment.—Laboratory, college buildings, wine cellars, farm buildings, and farm of about 1,600 acres.

Income.—Government grant for salaries, equipment, etc. (1902–3), $16,731. The farm is more than self-sustaining, the profits in 1901 amounting to $6,432.

Lines of work.—Variety tests of wheat, experiments with various manures and with green crops for feeding, rotation experiments, hor-

[a] See Royal Gardens, Kew, p. 161.

ticultural and viticultural work. But little purely experimental work is attempted.

TASMANIA.

Tasmania Department of Agriculture, Hobart.

George T. Collins, *Minis. of Agr.;* T. A. Tabart, *Sec. and Chief Insp.;* L. A. Evans, *Asst. Sec.;* T. Hogarth, *Editor of the Agricultural Gazette and Journal;* a council of eleven members and a scientific staff.

The Tasmania Department of Agriculture, with headquarters in Hobart, has general supervision of the agricultural interests in the island. The members of the scientific staff are engaged in scientific agricultural investigations, the analysis and inspection of various fertilizers and agricultural products, the repression of noxious weeds, animals, and insects, and the giving of instruction at meetings of farmers in various parts of the island. They give demonstrations at agricultural shows and conduct experiments throughout the island in cooperation with local associations affiliated with the department and known as "branch boards." The department publishes the *Agricultural Gazette and Journal* once a month, and sends it free to all members of "branch boards" and to libraries and chambers of commerce.

Botanic Gardens, Hobart.[a]

F. Abbott, *Supt.*

VICTORIA.

The Department of Agriculture of Victoria, Melbourne.

Hon. John Morrissey, *Minis. of Agr.;* E. G. Duffus, *Sec. of Agr.*

The Department of Agriculture employs a staff of about twelve experts engaged in making investigations and giving instructions throughout the colony in the various branches of agricultural industry, and, in addition, it controls the School of Horticulture at Burnley and the Viticultural College at Rutherglen, at both of which places limited experiments are conducted. The department also conducts cooperative experiments in many localities, subsidizes agricultural societies, issues occasional bulletins to agricultural producers, and publishes a monthly journal—the *Journal of Agriculture.*

Agricultural College and Experimental Farm, Dookie.

Governing board.—Council of Agricultural Education, consisting of eleven members, W. J. Lobb, *Pres.;* E. G. Duffus, *Sec. and Treas. and Sec. of Agr.* The college endowment lands, about 170,000 acres, are under the control of three trustees—Hon. F. T. Derham, Hon.

[a] See Royal Gardens, Kew, p. 161.

J. F. Levien, and Charles Yeo. The appointment of the principal and staff is subject to the approval of the Minister of Agriculture.

Staff.—Hugh Pye, *Prin. and Dir.*, assisted by resident lecturers in science, English, mathematics, agriculture, viticulture, dairying, veterinary science, and farm management; also a number of instructors and other officers.

Origin.—Opened for students in 1886.

Equipment.—College buildings, lecture halls, chemical laboratory, modern wine cellars, well-equipped dairy, piggeries, stables, barns, etc.; farm of 4,486 acres, including a vineyard of 40 acres and an orchard of 25 acres; about 50 horses, 1,500 sheep of various breeds, 150 head of cattle, and a number of pigs and poultry.

Income.—Rents received from the endowment lands, receipts from students' fees, sale of farm products and timber. The total expenditures for college and farm are about $29,200 per annum.

Lines of work.—Experiments with wheat and other cereals, grasses and fodder plants, both on a commercial and a smaller scale; manurial experiments; experiments in feeding stock; study of pure cultures in wine making and dairying; a limited time devoted to experiments with scent plants, olives, drying and preserving fruit. Considerable attention is given to the breeding of new wheats. An area of about 400 acres is annually devoted to cereals and fodder plants.

National Herbarium, Melbourne.[a]

J. G. Luehmann, *Cur.*

Botanic Gardens, Melbourne.[a]

W. R. Guilfoyle, *Dir.*

The Melbourne Botanic Gardens were started in 1846, under the curatorship of John Arthur, in a 5-acre field adjoining the Government House grounds. They now include a botanic garden of 83 acres, a lake of 10 acres, the public domain, 156 acres, and the Government House grounds, 61 acres. The garden proper has upon it a residence for the director, an extensive range of plant houses, a palm house, a tea house, a laboratory, an herbarium, and other buildings. It includes collections of native and introduced trees and plants, both ornamental and economic.

WESTERN AUSTRALIA.

The Western Australia Department of Agriculture, Perth.

Hon. Doctor Jameson, *Minis. of Agr.;* Alex. Crawford, *Actg. Dir. of Agr.;* W. B. Hooper, *Chief Clerk;* a staff of experts, inspectors, field officers, managers, and clerks.

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[a] See Royal Gardens, Kew, p. 161.

The department was organized in 1894, as a bureau of agriculture, with a board of six members. In 1898 it was made a department under the direct control of the Minister of Crown Lands. In 1902 the stock and rabbit departments and the agricultural bank were united with the Department of Agriculture, and the whole placed under the control of a director of agriculture. The department has the administration of the "Insect Pests Amendment Act" (governing the importation and distribution of all fruit and fruit trees and the supervision of all orchards and vineyards); the "Noxious Weed Act;" the "Fertilizers and Feeding Stuffs Act," and the "Contagious Disease Act;" and the control of all experimental work in agriculture. The experimental work has hitherto been confined to limited experiments at Drakesbrook, but is now being extended and experimental farms are being started at Northampton and Narrogin. The department publishes monthly the *Journal of the Department of Agriculture*, which is distributed free to members of any agricultural or kindred society. The expenditures of the department during the fiscal year ended June 30, 1902, were $59,153.65.

Experimental Farms.

P. G. Wicken, *Field Officer in charge of Expt. Farms.*

These farms are maintained by the Department of Agriculture for the purpose of conducting demonstration experiments.

Experimental Farm, Chapman.

This farm covers an area of 1,074 acres, of which 200 acres are under cultivation. Special attention is given to sheep breeding.

Experimental Farm, Drakesbrook.

The lines of work at this farm include experiments in the cross fertilization of wheat and other cereals, the seed of which is distributed among farmers. Cultural experiments are conducted with potatoes and forage crops.

Experimental Farm, Hamel.

G. F. Berthoud, *Mgr.*

The lines of work at this farm include experiments in the cross fertilization of wheat and other cereals, the seed of which is distributed among farmers. Cultural experiments are conducted with potatoes and forage crops.

Experimental Farm, Narrogin.

A. Robinson, *Mgr.*

This farm consists of 1,800 acres, of which 100 acres are under cultivation. The lines of work include experiments in growing wheat and other cereals and in poultry management.

AUSTRIA.

Royal Imperial Ministry of Agriculture, Vienna.

Baron de Giovanelli, *Minis. of Agr.;* Dr. Léonard Pielak, *Minister without Portfolio;* Dr. Ferdinand, Baron von Blumfeld, *Chief of Section;* Ernst Oser, *Chief of Section.*

The Royal Imperial Ministry of Agriculture of Austria was organized in 1868, and comprises two sections, which include the administrative bureau and 10 departments. The ministry has general control of agricultural institutions throughout the Kingdom, and is engaged actively in the promotion of investigations in agronomy, zootechny, forestry, fish culture, and a wide range of other subjects; the subsidizing of educational institutions, experiment stations and agricultural societies, and the printing and distributing of reports and special papers.

Department II (F. W. Dafert, *Dir.*) of the ministry is charged with the administration of agricultural and forestry educational institutions, including secondary schools, colleges, and special courses; the examination and appointment of teachers for these schools, and for itinerant instruction; the establishment and subsidizing of nongovernmental institutions for instruction and research; the management of governmental experiment stations and of experimental work generally; the compilation of agricultural and forestry statistics; the promotion of flax culture and dairying. Reports of the work of all experiment stations and papers on various phases of agricultural research appear in the official publication of the ministry, *Zeitschrift für das landwirthschaftliche Versuchswesen in Oesterreich.*

Agricultural Chemical Experiment Station of the Province of Vorarlberg, Bregenz.

Governing board.—The Vorarlberg Agricultural Society.

Station staff.—Dr. Wilhelm Eugling, *Dir. and Expert in Animal Husb.;* Dr. Heinrich Brunnmayr, *Asst.;* W. von Klenze, Dr. Ballner, *Volunteers;* attendant.

Origin.—Founded in 1875 by the Vorarlberg Agricultural Society. At first the station was located at Tisis, whence it was removed in 1886 to Feldkirch, and in 1896 to Bregenz.

Equipment.—Experiment field, stable for three cows, orchard, and place for growing vine cuttings. The equipment is provided by Count Belrupt, chairman of the agricultural society.

Income.—For 1900, $1,296.64 (Royal Imperial Ministry of Agriculture, $1,013; provincial committee, $202.60; fees, $81.04).

Lines of work.—Dairy investigations; practical experiments in the management of meadows, alpine pastures, and turf lands; control of fertilizers and tolls; analysis of foods.

Agricultural Experiment Station for Plant Culture, Brünn.

Governing board.—Agricultural Council for the Margravate of Moravia.

Station staff.—Johann J. Vañha, *Dir. and Agr.;* Otto Kyas, *Chem.;* T. Bukovanský, *Asst. Agr.;* two laboratory assistants; copyist; gardener.

Origin.—Established in 1899 by the Moravian Government.

Equipment.—Agricultural, chemical, and botanical laboratories; vegetation house; experiment field.

Income.—Total budget[a] for 1902, $5,601.18. The station receives $3,004.56 from the State and $40.52 from the Society of Austrian Malt Manufacturers, and about $190 for analytical work and from the sale of farm crops.

Lines of work.—Promotion of agriculture through scientific research in plant production by means of pot and field experiments in the vegetation house, the station experiment field, and on farms in other parts of Moravia; seed control; chemical investigation of fertilizers, feeding stuffs, and agricultural products in general; microscopic and bacteriological investigation of plant diseases.

Chemical Laboratory, Chrudim.

Prof. Joh. Trojan, *Dir.*
Established in 1884.

Seed Control Station of the State Agricultural Secondary School, Czernowitz.

Governing board.—Provincial committee of Bukowina.

Station staff.—Emil Baier, *Dir.*

Origin.—Established by the province in 1897.

Income.—In the budget of the Agricultural Secondary School an annual item of about $20 is included for seed testing.

Lines of work.—Analysis of seeds and feeding stuffs. The director gives advice to those engaged in the seed trade or in seed production, and attempts by means of his investigations to improve the seeds produced or handled in the country.

Agricultural Chemical Experiment and Control Station, Dublany, near Lemberg.

Governing board.—Provincial committee of Galicia.

Station staff.—J. M. Pomorski, *Dir.;* Adam Karpinski, Karol

[a] The term "budget" as used in this bulletin refers to the total allowance for station expenses made in accordance with the official estimate of the officers in charge of station funds from any funds available for the use of the station. The budget for any particular year is not necessarily equal to the receipts for that year.

Huppenthal. Zypmunt Chmielewski, *Assts.;* laboratory assistant; bookkeeper; two attendants.

Origin.—Established in 1895 by the Province of Galicia.

Equipment.—Laboratory, vegetation house with 800 pots, 10 experiment fields upon typical Galician soil in various parts of the province, each field containing about 14 acres.

Income.—Budget, $4,039.44. The station receives annually $405.20 from the Royal Imperial Ministry of Agriculture and $3,330.34 from the Galician Government. The fees for analyses amount to about $1,000 per annum.

Lines of work.—Investigation of the fertility of Galician soils by means of systematically planned field and meadow experiments in various parts of the country; investigation of fertilizers and soils; control of fertilizers and feeding stuffs; feeding experiments.

Agricultural Chemical Experiment and Seed Control Station of the Lower Austrian Agricultural, Horticultural, and Viticultural School, Feldsberg.

Governing board.—Lower Austrian Provincial Council.

Station staff.—Franz Kozeschnik, *Dir. and Chem.;* Vincenz Göhlert, *Seed Testing.* Both are teachers in the school.

Origin.—Founded in 1896. Before this time the chemist of the school had conducted gratuitous investigations with must, wine, fertilizers, and soils, and the increase of work led to the establishment of the station. The Royal Imperial Ministry of Agriculture in 1897 appropriated $340 toward the establishment of the station, the province providing the necessary equipment.

Equipment.—Laboratories of the school.

Income.—For 1900, $180.65 (Royal Imperial Ministry of Agriculture, $170.50; fees, $10.15).

Lines of work.—Analysis and control of seeds, chemical investigations, and other research work which the rural industries in the vicinity of Feldsberg demand.

Agricultural Chemical Experiment Station, Görz.

Governing board.—Royal Imperial Ministry of Agriculture.

Station staff.—Franz Gvozdenovic, *Dir.;* Arthur Devarda, Adolf Beneschovsky, *Assocs.;* Dr. A. N. Papež, *Asst.;* one volunteer; one clerk; one copyist; one attendant.

Origin.—The station was founded in 1869 under the name of the Silk Culture Experiment Station. In 1877 the name was changed to the Silk and Grape Culture Experiment Station. Since 1890 it has been known as the Agricultural Chemical Experiment Station.

Equipment.—The station includes divisions for agriculture, grape and wine production, study of plant diseases, and the rearing of silkworms.

Income.—Total budget, $6,078; fees for analyses, about $810.

Lines of work.—Scientific studies upon agricultural subjects in general; analysis of wines and dairy products; fertilizer experiments; repression of plant diseases; studies of diseases of the silkworm and of means for combating them.

Provincial Agricultural Chemical Experiment and Seed Control Station, Gratz.

Governing board.—Agricultural Committee of Styria.

Station staff.—Eduard Hotter, *Dir.;* Carl Wittmann, *Asst.;* one attendant.

Origin.—Founded in 1892 as the Pomological Experiment and Seed Control Station by the Horticultural Society of Mittelsteiermark; in 1896 brought under the control of the province.

Income.—Budget for 1900, $1,823.40; fees for analyses in 1900, $405.20. The station receives a subsidy of $810.40 from the Royal Imperial Ministry of Agriculture.

Lines of work.—Analysis and control of fertilizers, feeding stuffs, and seeds; analytical, physiological, and microscopic investigations in connection with the practice of agriculture, especially fruit growing.

Agricultural Experiment Station of the Agricultural School, Jungbunzlau.

Governing board.—The station is under the control of the director of the Agricultural School.

Station staff.—Friedrich Nebovidsky, *Dir.;* Carl Horny, *Asst.;* ten or fifteen volunteers—second-year students in the Agricultural School; attendant; gardener.

Origin.—Founded in 1885.

Lines of work.—Experiments with various agricultural plants, such as grains and hoed crops; analyses and tests of important agricultural products.

Experiment and Seed Control Station of the Agricultural Secondary School, Kaaden.

Governing board.—Provincial committee of Bohemia.

Station staff.—Prof. Andreas Nowoczek, *Dir.;* Prof. Emil Palm, *Chem.*

Origin.—The station was established in 1876.

Equipment.—Chemical laboratory, seed laboratory, agricultural laboratory, and experimental gardens.

Income.—Partly supported by fees, which in 1900 amounted to $48.62.

Lines of work.—Fertilizer experiments; investigation of disinfectants and insecticides; field experiments with clovers; variety tests of apples; chemical investigations and analysis of soils, feeding stuffs, fertilizers, milk, agricultural products, and the products of starch,

sugar, beer, and spirituous liquor manufacture; meteorological observations; analysis and control of seeds. Seed producers and dealers are required to guarantee their seeds. Another function of the station is to promote the seed-producing industry by scientific investigations, the results of which are made public.

Agricultural Chemical Experiment Station of the Royal Imperial Agricultural Society of Carnithia, Klagenfurt.

Governing board.—Royal Imperial Agricultural Society of Carnithia.

Station staff.—Dr. H. Svoboda, *Dir.;* F. Schulze, *Asst.;* chemist.

Origin.—Founded in 1893 by the society mentioned.

Income.—Budget for 1902, about $2,030. The station is subsidized as follows: Royal Imperial Ministry of Agriculture, $812; Province of Carnithia, $243.60; city of Klagenfurt, $121.80; Carnithian Chamber of Commerce and Industry, $81.20.

Lines of work.—Chemical, microscopic, bacteriological, and physiological investigation of articles sent to the station; control of commercial fertilizers, feeding stuffs, and agricultural seeds; practical agricultural experiments and food control; the giving of verbal and written information.

Agricultural Chemical Experiment Station for Carniola, Laibach.

Governing board.—The provincial government in Laibach, subject to supervision by the Royal Imperial Ministry of Agriculture.

Station staff.—Dr. Ernst Kramer, *Dir. and Chem.;* one other chemist.

Origin.—Founded in 1898 by the Royal Imperial Agricultural Society of Carniola.

Income.—Budget for 1900, $1,285.50; fees for analyses in 1900, $364.68. The station is subsidized by the Royal Imperial Ministry of Agriculture, the Province of Carniola, the Carniolan Chamber of Commerce and Industry, and the city of Laibach to the amount of $1,195.34.

Lines of work.—The promotion of agriculture, especially grape growing, by means of scientific investigations; analysis of agricultural products and the study of their diseases; analysis and control of fertilizers, feeding stuffs, and seeds; analysis of soils, and analytical, physiological, and microscopic work of all kinds, including the analysis of foods and condiments for officials, societies, and private persons; dissemination of information verbally and by correspondence.

Agricultural Chemical Experiment and Seed Control Station, Leitmeritz.

Governing board.—The trustees of the Agricultural, Horticultural, and Viticultural School.

Station staff.—A. J. Kollar, *Dir.;* W. Widmar, *Chem.;* H. Schmidt, *Bact. and Veg. Path.;* E. Brandsch, *Seed Control;* clerk; laboratory assistant; gardener; cellar master.

Origin.—Established in 1894 by the trustees of the Agricultural, Horticultural, and Viticultural School.

Equipment.—The school provides accommodations for divisions of chemistry, bacteriology, vegetable pathology, and seed control.

Income.—Budget, $567.28 (State, $243.12; province, $243.12; district assembly, $40.52; city of Leitmeritz, $40.52). The fees for analyses in 1901 amounted to $590.62.

Lines of work.—Seed control; chemical, bacteriological, and pathological investigations; field experiments.

Agricultural Botanic Experiment Station, Lemberg.

Governing board.—Provincial committee of Galicia.

Station staff.—Dr. Ign. R. von Szyszylowicz, *Dir.;* Bronislaus von Janowski, Casimir von Langie, and Dr. Matilda Goldflussowna, *Assts.;* Simeon Wojciechowski, *Lab. Asst.;* one attendant; eight helpers during the busy season.

Origin.—Established in 1895 by the provincial committee of Galicia. In 1901 an alpine garden under control of this station was established in the Porzyzewski pasture lands of the East Carpathians.

Equipment.—Station at Lemberg, experiment garden in the East Carpathian Mountains, 5,700 feet above sea level.

Income.—Budget for 1900, $3,450.19. The station receives from the Royal Imperial Ministry of Agriculture a subsidy of $405.20, and in 1901 received in fees for analyses $481.52.

Lines of work.—Control of seeds and concentrated feeding stuffs, experiments for the improvement and acclimatization of plants, and the production of alpine seeds at the alpine garden.

Prince Schwarzenberg Agricultural Chemical Experiment Station, Lobositz.

Governing board.—The station is a private institution under the direct control of Prince Schwarzenberg.

Station staff.—Dr. Josef Hanamann, *Dir.;* Leopold Kouřimsky, *Assoc.;* copyist; attendant.

Origin.—Founded in 1865 at the initiative of His Highness Prince Johann Adolf von Schwarzenberg. The director, Dr. Josef Hanamann, has held this position since the station was first established.

Equipment.—Laboratory.

Income.—Budget for 1900, including salaries, $1,418.20.

Lines of work.—Control of fertilizers and feeding stuffs; vegetation and fertilizer experiments; various investigations for industrial purposes; analyses of soils, minerals, well water, and flowing water; meteorological observations.

Provincial Agricultural Chemical Experiment and Seed Control Station, Marburg-on-the-Drave.

Governing board.—Provincial committee of Styria.

Station staff.—Edmund Schmid, *Dir.;* Jos. Czak, *Asst.;* one attendant.

Origin.—Founded in 1893 by the Province of Styria.

Income.—Total budget for 1901, $1,750; fees for analyses for 1901, $300. The station receives a subsidy of $486.24 from the Royal Imperial Ministry of Agriculture.

Lines of work.—The promotion of agriculture, especially grape growing in Styria, through scientific investigations, analyses, study of diseases, etc.; analysis and control of fertilizers, feeding stuffs, soils, and seeds; analytical, physiological, and microscopic investigation of foods, condiments, and other articles for the agricultural committee of Styria, officials, societies, and private persons; the promotion of seed production and commerce. Results are made public by consultation and correspondence, and expert opinions are given as required by the committee.

Forestry Experiment Institute, Mariabrunn.[a]

Governing board.—Royal Imperial Ministry of Agriculture.

Station staff.—Josef Friedrich, *Dir.;* Adalbert Schiffel, *For. Counsellor;* Carl Böhmerle, Dr. Adolf Cieslar, Dr. Norbert Lorenz, Ritter von Liburnau, *Assocs.;* Gabriel Janka, *For.;* Walther Sodlaczek, *Asst.;* Johann Czaja, *Gard.;* a librarian, three helpers, three laborers, a consulting entomologist and meteorologist.

Origin.—Founded in 1875, but not fully developed to its present scope until 1888, when it was made a control station for forest seeds.

Equipment.—Chemical, technological, and plant physiological laboratories; a plant for testing strength of materials; botanic garden; forest gardens for experiments with fertilizers, and forest nursery.

Income.—The institute is maintained entirely by the State, at a cost of about $15,000 per annum.

Lines of work.—Development by scientific experiment and research of a rational method of forest management. Investigations in entomology, mycology, and meteorology as related to forestry are conducted. Seed control is also a function of this institution. Results of the investigations are published in the *Centralblatt für das Gesammte Forstwesen* and in *Mittheilungen aus dem Forstlichen Versuchswesen Oesterreichs.*

Moravian Seed Control Station, Neutitschein.

Governing board.—Moravian Provincial Committee.

Station staff.—Prof. Richard Hamerak, *Dir.;* laboratory assistant.

[a] Post-office, *Hadersdorf-Weidlingau, Lower Austria.*

Origin.—Founded in 1881 by Doctor Zoebl, with the permission of the Moravian Provincial Committee. In 1891 the station became a State institution.

Equipment.—A well-equipped laboratory with a vegetation house attached and an experimental garden.

Income.—The station receives a provincial subsidy of $20.26, and fees for analyses average about $18 per year.

Lines of work.—Microscopic examination of seeds, hops, and feeding stuffs; compounding of seed mixtures for meadows and pastures; conducting fodder-culture courses. After the erection of a new agriculture laboratory experiments in bacteriology and plant physiology will be undertaken.

Agricultural Chemical Experiment Station, Neutitschein.

Governing board.—The station is under the control of the Agricultural Secondary School in Neutitschein.

Station staff.—Alfred Wiener, *Dir.;* one attendant.

Origin.—Founded in 1886.

Income.—Partly supported by fees, which amount to about $12 per annum.

Lines of work.—Analysis of agricultural products, such as potatoes, beets, and milk, and of water and commercial fertilizers.

Agricultural Chemical Experiment Station of the State Agricultural Secondary School, Oberhermsdorf.

Governing board.—Silesian Provincial Committee.

Station staff.—Rudolf Pfohl, *Dir. and Chem.;* one attendant.

Origin.—Founded in 1875 by the provincial committee.

Lines of work.—Analysis of feeding stuffs, fertilizers, waters, beets, potatoes, etc., and of articles used by farmers.

Agricultural Chemical Experiment Station of the Agricultural Council for Upper Austria, Otterbach, near Schärding.

Governing board.—Agricultural Council for Upper Austria, the Royal Imperial Ministry of Agriculture reserving the right to superintend the work of the station.

Station staff.—Franz Xav. Hanusch, *Dir. and Chem.;* one attendant.

Origin.—Founded in 1900 by the Upper Austrian Agricultural Council through an agreement with Lord George Wieninger, by which the latter placed at the disposal of the council, until further notice, the necessary room for laboratories and ground for an experiment field.

Income.—Total budget for 1901, $1,684.38. The government subsidy for the station is $812; that of the province, $203.

Lines of work.—Scientific and practical investigations in animal and plant production; culture and fertilizer experiments; investigations

and analyses in connection with the practice of agriculture and the marketing of its raw products, especially the analysis and control of fertilizers, feeding stuffs, foods, and seeds, at the request of officials, corporations, societies, and private persons; dissemination of information by consultation and correspondence; the giving of expert information for officials and agricultural corporations; the training of agricultural chemists and agriculturists for the investigation of agricultural products and supplies.

Provincial Agricultural Institute and Experiment Station, Parenzo.

Governing board.—Provincial Agricultural Committee of Istria.

Station staff.—Dr. G. B. Cucovich, *Dir.;* Dr. Gherardo Catani, *V.-Dir.;* Donato Libutti, *Assoc.;* director's secretary; attendant; cellar master; gardener.

Origin.—Founded in 1875 by the Istrian Agricultural Committee. From 1875 to 1882 it consisted of an experiment cellar only. In 1882 a two-year enological and pomological course was added. In 1892 the institute and experiment station were opened, and in 1900 a three-year course was added.

Income.—Budget of institute and station for 1901, $9,522.20; provincial subsidy for institute and station, $1,539.76.

Lines of work.—Chemical investigation of agricultural products and articles used by farmers, especially grapes, must, wine, sulphur, blue vitriol, soils, and fertilizers; seed control; study of plant diseases.

Chemical Laboratory, Pilsen.

Governing board.—The laboratory is a private institution under the entire control of the founder and director.

Staff.—F. Kundrát, *Dir.;* one assistant.

Origin.—Founded in 1886 by F. Kundrát. In 1890 the Pilsen Assembly subsidized the laboratory.

Equipment.—A laboratory fully equipped with gas, water, motor power, polarimeters, microscopes, micro-photographic outfit, spectroscope, refractometer, and a Berthelot-Mahler calorimeter; a good working library. The laboratory also has the use of experiment fields, gardens, and stables belonging to the agricultural school with which it is connected.

Income.—The total receipts for 1900, including the subsidy of $203, was $952.

Lines of work.—By the terms of the act subsidizing the laboratory the director is required to make investigations and conduct experiments for the farmers in the vicinity of Pilsen, for which services fees regulated by the assembly are exacted. In 1897 the director was appointed city chemist, and in 1900 he was authorized to analyze foods.

Agricultural Chemical Experiment and Seed Control Station of the German Section of the Agricultural Council for the Kingdom of Bohemia, Prague.

Governing board.—Agricultural Council of the Kingdom of Bohemia.

Station staff.—Josef Klaudi, *Dir. Chem. Lab.;* Dr. J. Nickerl, *Dir. Seed Control Sta.*

Origin.—The station was established in 1877 by the Agricultural Council.

Lines of work.—Seed control; analysis of fertilizers, soils, sugar beets, potatoes, etc.; investigation of plant diseases and noxious insects and of foods and feeding stuffs.

Agricultural Physiological Experiment Station of the Bohemian Section of the Agricultural Council for the Kingdom of Bohemia, Prague.

Governing board.—Royal Imperial Ministry of Agriculture and the Provincial Committee of the Kingdom of Bohemia.

Station staff.— ——— ———, *Dir.;* Dr. Franz Bubák, *Chief Div. of Veg. Path.;* B. Procházka, *Agr.;* Eugen Vitek, *Chem.;* Josef Smahel, *Chem.;* two attendants.

Origin.—Founded in 1899 by the Royal Ministry of Agriculture and the Ministry of Education and Religion. The station and the Technical High School are in the same buildings, but have no organic connection. This station is in close relation with the sugar experiment station in Prague, of which Prof. Karl Preis is director.

Equipment.—Chemical, physiological, and bacteriological laboratories; glass house for physiological experiments, and a biological room for the study of the vital processes of microbes.

Income.—Subsidies amounting to $1,215.60 (Royal Imperial Ministry of Agriculture, $810.40; provincial committee, $405.20).

Lines of work.—The physiological section and seed control station are devoted to the improvement of the quality of grains and hoed crops; the section of bacteriology and pathology to the study of plant diseases and to micro-biological studies in plant production; the chemical section to the investigation by chemical means of problems similar to those above.

Experiment Station for the Sugar Industry, Prague.

Governing board.—Society for the Sugar Industry in Prague.

Station staff.—Prof. K. Preis, *Dir.;* K. Andrlík, *Chief Div. of Tech. Chem.;* Dr. Julius Stoklasa, *Chief Div. of Physiol. and Path. of the Sugar Beet;* E. Votoček, *Chief Div. for Sci. Invest. with Carbohydrates;* V. Staněk, E. Vítek, *Assts.;* six volunteers; one attendant.

Origin.—Founded in 1896 in connection with the department of analytical chemistry in the Technical High School under permission from the Ministry of Education and Religion and with the understand-

ing that the Society for the Sugar Industry in Prague meet all additional expenses.

Equipment.—Laboratories of the Technical High School, which are also used by the Agricultural Physiological Experiment Station.

Income.—Budget for 1900, $2,431.20. The station receives a subsidy of $810.40 from the Royal Imperial Ministry of Agriculture and of $202.60 from the Bohemian Assembly.

Lines of work.—Technical chemical investigations in the manufacture of beet sugar, investigations in plant physiology for the purpose of introducing rational methods of cultivating the sugar beet, and study of beet diseases.

Experiment Station for the Distilling Industry, Prague.

Governing board.—Society of Distillers in Prague.

Station staff.—Anton Nyrdle, *Dir.;* Camill Havelka, *Chem.;* laboratory assistant. The students of the Distillery School assist in the experiment station laboratories for the practice it gives them.

Origin.—Established in 1881 in connection with the Distillery School, which in the year 1900–1901 received 22 students.

Income.—Budget for 1900 for both station and school, $2,026. The receipts from analyses in 1900 amounted to only about $40. The Royal Imperial Ministry of Agriculture and the Provincial Committee of Bohemia have granted a subsidy of $607.80 for the use of both station and school.

Lines of work.—Mycological and chemical investigations in connection with both old and new processes in distilling and in the manufacture of liquors and compressed yeast; yeast production and manufacturing; analysis of raw stuffs and manufactured products, perfecting and introducing rational business methods.

Experiment Station for the Brewing Industry, Prague.

Governing board.—Directors of the Society for the Founding and Maintenance of the Experiment Station for the Brewing Industry in Bohemia.

Station staff.—Franz Chodounský, *Dir.;* Jaroslav Sula, *Chem. and Supt. of Labs.;* Wenzel Bareš, *Assoc.;* Jan. Satava, *Asst.;* bookkeeper; laboratory assistant.

Origin.—Founded in 1886 by the Society for the Founding and Maintenance of the Experiment Station for the Brewing Industry in Bohemia.

Income.—Budget for 1901, $9,648.18. The receipts for 1901 for analyses and other investigations amounted to $3,501.34.

Lines of work.—The promotion of brewing interests by scientific work and research; testing of raw materials and other products sent

to the station; manufacture of pure-yeast cultures; theoretical and practical control of improved methods of work in breweries and malt houses; the giving of advice to officials, members of societies, and others; the testing of such building materials and machinery and such chemical and physical apparatus as are used in breweries and malt houses; the delivery of lectures on professional topics and the giving of practice courses for students.

Agricultural Seed Control Station of the State Agricultural High School, Prerau.

Governing board.—Moravian Provincial Committee.

Station staff.—Prof. Vrat. Stöhr, *Dir.;* laboratory assistant; gardener.

Origin.—Founded in 1884 by the Moravian Provincial Committee.

Equipment.—Botanical laboratory.

Income.—Budget for station work in 1900, about $20. The station receives a State subsidy of $20.26 and fees amounting to about $10.

Lines of work.—Analysis of seeds and feeding stuffs, botanical analysis of meadow grasses, mechanical analysis and control of hops, a special study of beet diseases, qualitative tests of barley for brewing. The station assists the school with which it is connected in making collections of seeds and investigates in the laboratory the crops grown in the experiment field of the school.

Provincial Agricultural Institute and Experiment Station, St. Michael-on-the-Etsch, Tyrol.

Governing board.—Provincial committee of Tyrol.

Station staff.—Joseph Schindler, *Dir.;* Karl Waschata, *1st Asst. Chem.;* Karl von Gramatica, Emanuel Kohlert, *Assts. Chem.* Students at the institute serve for a time on the staff of the station. The members of the station staff serve in the same capacity for the institute.

Origin.—Established in 1874 by the Province of Tyrol.

Income.—Budget, $1,296.64; fees for analyses in 1901, $1,681.58. The salaries of the three assistants, amounting to $486.24, are met by subsidy from the Royal Imperial Ministry of Agriculture.

Lines of work.—The station assists Tyrolese farmers on all technical agricultural problems, exercises control over commercial fertilizers and seeds, and analyzes foods and agricultural products. Especial attention is given to wine products, also to such bacteriological studies as are of importance to agriculture.

Agricultural Chemical Experiment Station, Spalato.

Governing board.—Royal Imperial Ministry of Agriculture.

Station staff.—Johann Slaus-Kantschieder, *Dir.;* Anakleto Gazzari, *Asst.;* one technical assistant, bookkeeper, laborer, attendant.

Origin.—The station was established in 1894 by the Royal Imperial Ministry of Agriculture.

Equipment.—Laboratory for chemical investigations and experiments, technical museum for illustrative purposes.

Income.—Total budget, about $7,000; fees for analyses in 1902, $637.

Lines of work.—Scientific research and chemical and microscopic investigations, with special reference to the three principal Dalmatian products—wine, oil, and silk; study of means for combating the diseases of field crops; analysis and control of fertilizers and feeding stuffs; and analytical and microscopic work for the Ministry of Agriculture and other officials, as well as for societies and private persons. Information to public officials and others is given by lectures, consultations, and correspondence.

Agricultural Experiment Station, Tabor.

Governing board.—Trustees of the Agricultural Academy.

Station staff.—Franz Farský, *Dir.;* laboratory assistant.

Origin.—Founded in 1874 by the trustees of the Provincial Agricultural High School.

Equipment.—Chemical laboratory and vegetation house, the former a sirup factory rebuilt in 1875.

Income.—The trustees of the academy appropriated $222.86 for station work in 1901.

Lines of work.—Agricultural chemical studies in plant and animal production, studies in the industries related to agriculture, investigation of agricultural products and control of agricultural supplies, analysis of agricultural products and of the by-products in the industries related to agriculture, experiments with fertilizers, investigations in plant nutrition in natural or prepared soils, digestion experiments.

Agricultural Botanic Experiment Station of the Agricultural Academy, Tabor.

Governing board.—Trustees of the Agricultural Academy.

Station staff.—Prof. Theodor Erben, *Dir.;* Adalbert Netík, *Asst.;* laboratory assistant.

Origin.—The station was first established in 1893 as a seed control station in connection with the academy, but in 1895 the scope of its activity was broadened to include all phases of plant production.

Income.—Three thousand four hundred and forty-four dollars and twenty cents.

Lines of work.—Investigation of various cultivated plants, their nutrition, diseases, etc.; seed control; instruction to farmers on the cultivation and manuring of field crops.

Agricultural Chemical Experiment Station of the State Agricultural Academy, Tetschen-Liebwerd.

Governing board.—Bohemian Provincial Committee.

Station staff.—Prof. Josef Seissl, *Dir.;* Jos. Neuber, *Asst.;* laboratory assistant.

Origin.—Founded in 1865 by the trustees of the then Agricultural High School.

Equipment.—The chemical technological laboratory of the academy.

Income.—For the laboratory and experiment station, $324.16.

Lines of work.—The scientific investigation of problems in agricultural chemistry.

Experiment Station for Flax Culture, Trautenau.

Governing board.—Association of Austrian Flax and Linen Producers in Trautenau, subject to supervision by the Royal Imperial Ministry of Agriculture.

Station staff.—Dr. Camilo Hoffmeister, *Dir. and Chem.;* two attendants.

Origin.—Founded in 1894 by the association mentioned above.

Equipment.—Building containing well-equipped bacteriological laboratory and chemical laboratory; experiment garden and experiment field.

Income.—The Royal Imperial Ministry of Agriculture appropriates $1,215.60 a year for the support of the station, and the Association of Austrian Flax and Linen Producers provides the remaining funds necessary to meet the running expenses of the station. The total budget varies from $1,600 to $2,000.

Lines of work.—Investigations in growing, dressing, and manufacturing flax. The investigations include chemical, physiological, and agricultural studies.

Agricultural Botanic Experiment and Seed Control Station, Troppau.

Governing board.—Provincial committee of Silesia.

Station staff.—Otto Kamberský, *Dir.*

Origin.—Founded in 1891 as a private station by the present director. In 1900 it became a provincial institution.

Equipment.—Laboratory at Troppau; experiment field at Salasz, established and maintained by the Royal Imperial Ministry of Agriculture.

Income.—The station receives about $200 a year from the Royal Imperial Ministry of Agriculture and the provincial committee of Silesia. The fees for analyses in 1900 amounted to about $152.

Lines of work.—Experiments and investigations in plant production, laboratory, and field experiments for the improvement of seeds and the testing of varieties, entomological investigations, control of seeds, and feeding stuffs.

Agricultural Chemical Experiment Station and Station for Plant Protection and Bacteriological Investigations, Vienna.

Governing board.—Royal Imperial Ministry of Agriculture.

Station staff.—I. Agricultural Chemical Experiment Station: Prof. J. F. Wolfbauer, *Actg. Dir.;* Dr. Eduard Hoppe, Adolf Halla, Otto Reitmair, *Assocs.;* Dr. Franz Freyer, Dr. Wilhelm Bersch, Maximilian Ripper, Dr. Theodor Schmitt, Ferd. Pilz, *Assts.* II. Station for Plant Protection and Bacteriological Investigations: Dr. Karl Kornauth, *Chief;* Dr. Ludwig Hecke, *Assoc.;* Otto von Czadek, Camillo Ehrmann, *Assts.;* a large number of helpers, volunteers, clerks, and attendants.

Origin.—The Agricultural Chemical Experiment Station was founded in 1869 by the Royal Imperial Ministry of Agriculture. At first it was provided with rooms in the Military Veterinary Institute, but in 1894 was removed to a building erected for the purpose at a cost of $34,442. In 1902 the Chemical Physiological Experiment Station for Wine and Fruit Growing at Klosterneuburg was discontinued and the major part of its work transferred to this station.

The Station for Plant Protection and Bacteriological Investigations was founded in 1902 and provided quarters in a building erected in 1901 at a cost of $31,320.

Equipment.—Two buildings provided with all modern apparatus, in which are located (1) the chemical station, including laboratories for agricultural chemistry and technical chemistry, institute for the investigation of foods and petroleum, division for moor culture and peat utilization, and a division for plant culture; and (2) the station for plant protection and bacteriological investigations, including the division for the culture of mouse typhus. A branch vegetation station is located at Korneuburg.

Income.—Total budget for 1902: Agricultural Chemical Experiment Station, $21,326.77; Station for Plant Protection and Bacteriological Investigations, $5,822.04; the fees for analyses in 1901 amounted to $1,424.94.

Lines of work.—At the agricultural station, scientific research in animal and plant production; investigations and analyses in subjects closely identified with agricultural practice, especially the investigation and control of fertilizers and feeding stuffs; at the Station for Plant Protection and Bacteriological Investigations, the study of microorganisms, injurious and beneficial animals, and in general the conducting of analytical, physiological, and microscopic investigations for the Royal Imperial Ministry of Agriculture and other authorities, as well as for societies and private persons. Information to the public is given by lectures, consultations, and correspondence.

Seed Control Station (Agricultural Botanic Experiment Station), Vienna.

Governing board.—Royal Imperial Ministry of Agriculture.

Station staff.—Dr. Theodor Ritter von Weinzierl, *Dir.;* Gustav Pammer, *Chief Div. of Plant Breeding;* Demeter Sakellario, *Assoc.;* Josef Hojesky, Karl Komers, *Assts.;* Eligius Freudl, Emil von Haunalter, *Aspirants;* one chemist and four assistants; one assistant for the alpine experiments; three clerks; two attendants.

Origin.—Established in 1881 in a private dwelling by the Royal Agricultural Society of Vienna and subsidized by the Royal Imperial Ministry of Agriculture; moved in 1886 to the rooms of the society; reorganized and broadened in 1895 and brought under the control of the Royal Imperial Ministry of Agriculture. In November, 1902, the division of plant breeding was added.

Equipment.—Laboratory for seed testing; room for beet seed; vegetation house; chemical, botanical, and micro-bacteriological laboratories with adjacent offices and other rooms; experimental gardens for grain, seed, and fodder production at Melk, Siebenbrunn, and Tullnerbach; an alpine station, and three alpine experiment fields.

Income.—Total budget for 1900, including the endowment for alpine and flax experiments, $13,006.92; fees for analyses in 1900, about $4,862.40.

Lines of work.—Analysis and control of all agricultural and forest seeds; microscopic examination of concentrated feeding stuffs; analytical, pysiological, and microscopic investigations for the Royal Imperial Ministry of Agriculture and other officials, societies, and private persons; the dissemination of information to the public by consultation and correspondence; investigations in the production of plants, seeds, and fodders, and in vegetable pathology, partly in the laboratories and vegetation house and partly in the experimental fields.

Chemical Technical Experiment Station of the Central Society for the Beet-Sugar Industry in Austria-Hungary, Vienna.

Governing board.—Committee of the Central Society for the Beet-Sugar Industry in Austria-Hungary.

Station staff.—Friedrich Strohmer, *Dir.;* Anton Stift, *V.-Dir.;* Ottokar Fallada, *Assoc.;* Albert Blau and Robert Salich, *Assts.;* three clerks; three attendants.

Origin.—This is the oldest station in Austria, and was established by the society mentioned in 1859 in the Königsaal Sugar Factory in Bohemia. In 1867 it was moved to Prague and in 1870 to Vienna. At this time Dr. O. Kohlrausch became director, and remained in that position until he was retired on a pension in 1887.

Equipment.—Accommodations are provided for three divisions—the division for scientific investigation, the division for commercial analyses, and the division of plant physiology.

Income.—Maintained by the central society at an annual cost of about $11,750.

Lines of work.—The station staff endeavors to keep pace with the progress of sugar making and to study and experiment upon all new processes in the production of sugar, so that anything of real value can be recommended to the producers of the district; analyzes the products of factories and farms; gives gratuitous information regarding beet diseases and patents that concern sugar producers; edits the technical parts of the *Österreichisch-ungarische Zeitschrift der Zuckerindustrie und Landwirthschaft*, published by the Central Society, and gives instruction in the chemistryof sugar making to young men who wish to devote themselves to that business.

Austrian Experiment Station and Academy for the Brewing Industry, Vienna.

Governing board.—Under the control of the society "Austrian Experiment Station for Brewers and Maltsters."

Station staff.—Professor Prior, *Dir.;* Dr. H. Wichmann, *Dir. of the Biol. Lab.;* Dr. H. Zikes, *Assoc.;* G. Ewald, J. Bongough, B. Biondrek, *Assts.;* three clerks; three helpers; machinist; fireman; brewer in the experimental brewery.

Origin.—Founded in 1887 by the society mentioned as a chemical physiological laboratory; broadened to its present scope in 1895.

Equipment.—Chemical laboratory, biological laboratory, academy for the brewing industry, brewery and malt house for instruction and experiments.

Income.—Budget for 1900, $13,371.60. The station is subsidized by the above society to the amount of $2,836.40, and in 1900 collected fees for analyses amounting to about $8,914.

Lines of work.—Scientific investigations of all materials used in the manufacture of beer and of the manufactured products of breweries and malt houses; testing of machinery and apparatus; inspection of brewery products; making of pure cultures; instruction in brewing and malting; practical experiments in the experimental brewery.

BELGIUM.

Department of Agriculture, Brussels.

Baron M. Van der Bruggen, *Minis. of Agr.*

The Belgian Department of Agriculture was organized in 1884 as the Department of Agriculture, Industry, and Public Works, which designation it retained until 1899. It includes the following branches: (1) The Office of the Secretary, which includes (a) the general supervision of the department and of its agents, and (b) control of accounts and pensions; (2) the Bureau of Agriculture with the following divisions: (a) Animal industry, (b) agricultural instruction, the State botanic

garden, and the service of State agriculturists, and (c) agricultural associations, agricultural statistics, the State Chemical and Bacteriological Institute, and the analytical laboratories; (3) the Bureau of Forestry, which has a central office in Brussels and branches in the different provinces, and is charged with the preservation and management of the forests of the State, the improvement of waste lands, and the execution of fish and game laws; (4) the Bureau of Public Health and Hygiene; (5) the Bureau of Public Rural Roads, and (6) the direction of fine arts. The total budget of the department for 1904 was $2,533,568.13.

As already indicated, the system of experimental and control work is under the supervision of the Bureau of Agriculture. The State Chemical and Bacteriological Institute at Gembloux, and the State analytical laboratories at Gembloux, Ghent, Hasselt, and Liège were established by the Association for the Founding of Agricultural Experiment Stations in Belgium, and came under Government control in 1883. Since that time the Government has organized analytical laboratories at Antwerp, Mons, and Louvain. The Bureau of Agriculture also conducts a large number of experimental and demonstration fields in various parts of the country. In selecting these fields a soil is chosen which seems to be representative of the region. The bureau furnishes the necessary seeds and fertilizers, outlines the work, and requires from the owner of the farm a report upon the result of the experiments. The inspector-general of agriculture and two inspectors of agriculture supervise the experimental and demonstration fields, inspect the agricultural, horticultural, and dairy colleges and schools, and confer with agriculturists regarding the organization of societies and the establishment of provincial schools for the giving of short courses of instruction in agriculture, dairying, horticulture, zootechny, apiculture, etc. Annual reports of the State Chemical and Bacteriological Institute at Gembloux and of the analytical laboratories and demonstration fields in various parts of Belgium are published in the *Bulletin de l'Agriculture* (*Bruxelles*).

Analytical Laboratory, Antwerp.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—D. Crispo, *Dir.;* two chief assistants; three assistants; and a clerk.

Origin.—Founded in 1885 by the Government.

Equipment.—Laboratory building containing an office, two analytical laboratories, a balance room furnished with balances, polariscope, microscopes, etc., and a workroom.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs,

and agricultural products; seed testing. In addition to this general work the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who have accepted the control of the State laboratories; it participates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Chemical Laboratory, Bruges.

Staff.—Franz de Walque, *Dir.*

Lines of work.—Analysis of agricultural products, fertilizers, feeding stuffs, and miscellaneous substances.

Communal Laboratory, Courtrai.

Staff.—J. Morreau, *Dir.*

Lines of work.—Analysis of commercial fertilizers, agricultural products, and other substances.

State Chemical and Bacteriological Institute, Gembloux.

Governing board.—Department of Agriculture.

Station staff.— ——— ———, *Dir.;* A. Gregoire, *Actg. Dir. and Chief Div. of Chem.;* L. Remy, *Chief Div. of Bact.;* Joseph Hendrick, *Asst. Chem.;* Emile Carpiaux, *Asst. Chem.;* L. Palmans, *Asst. Bact.;* D. Delaude, *Accountant;* a helper.

Origin.—Organized and opened to the public in 1871 by the Association for the Founding of Agricultural Experiment Stations in Belgium, which received from the Government an annual subsidy of $2,000 (later $2,800) and a special subsidy of $4,000 for the establishment of this station. In 1883 the State government assumed control of the station and became responsible for its financial support. In 1892 this and other stations that had been established underwent a reorganization by which analytical and control work for corporations and private persons was given over entirely to State analytical laboratories, and research work became the principal function of this station. On June 15, 1901, the station was again reorganized, a division of bacteriology was added, and the name was changed to its present form.

Equipment.—Well-furnished chemical and bacteriological laboratories containing library, museum, and apartments for experiments on the nutrition of animals, and provided with electric lights and petroleum and hot-air engines; an experimental garden and field, a vegetation house and boxes for vegetation experiments, and a meteorological observatory.

Income.—All the expenses of the station are paid from the budget of the Department of Agriculture. In 1902 these amounted to $6,648.85.

Lines of work.—Research work, including the study of physiological, chemical, and bacteriological questions as applied to agriculture. No analyses for the public are made, but for the Department of Agriculture a great deal of such work is done. The analytical work includes the analysis of fertilizers and seeds for use in the experimental fields and of the products of the fields, physical-chemical analysis of soils for the purpose of preparing soil maps, analysis of waters and foods, and meteorological observations. In case of difference between any of the analytical laboratories regarding the analysis of any article, the committee having charge of the laboratories refers the matter to the State Chemical and Bacteriological Institute at Gembloux. Reports of the work at Gembloux are published in the *Bulletin de l'Agriculture* (*Bruxelles*) and in bulletins of the institute.

Dairy Station, Gembloux.

Governing board.—A committee composed of several men of note in dairy husbandry, the inspector of agriculture (Paul de Vuyst), and the inspector of feeding stuffs.

Station staff.—Dr. M. Henseval, *Dir.;* L. Marcas, *Asst.*

Origin.—This station was established early in 1901, in accordance with a royal decree of December 24, 1900. It is maintained in connection with the Agricultural Institute of Gembloux, but is under the management of a special committee named by the Minister of Agriculture.

Equipment.—The station is installed in the buildings of the dairy at the farm of the Agricultural Institute, where a large laboratory is utilized for chemical and bacteriological investigations and all the apparatus necessary for research work is provided.

Income.—For 1902, about $2,895 from the State.

Lines of work.—Dairy investigations, tests of dairy machinery, feeding experiments, etc.

Analytical Laboratory, Gembloux.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—Charles Masson, *Dir.;* a chief assistant, four assistants, and a clerk.

Origin.—Established by the Association for the Founding of Agricultural Experiment Stations in Belgium and turned over to the Government in 1883.

Equipment.—Laboratory building containing on the first floor a laboratory for the analysis of fertilizers, a balance room, and a workroom; on the second floor the office of the director, library, laboratory for the analysis of foods, two laboratories for the analysis of

beets, and a dark room; in the basement a gas machine and heating apparatus. The laboratory is thoroughly equipped throughout.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing. In addition to this general work, the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who have accepted the control of the State laboratories; and it participates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Provincial Experimental Garden, Ghent.

Staff.—P. de Caluwe, *Dir.*

The committee of agriculture of the Province of East Flanders has maintained at Ghent since 1862 an experimental garden with an area of about 2½ acres, and containing a dwelling, stables, and vegetation cases. Systematic experiments are conducted with various manures and cereals, legumes, forage and root crops, and industrial products, such as flax and chicory. Other lines of work include variety tests, tests of different quantities of seed per acre, experiments in the management of meadows and old pastures on alluvial soils in the vicinity, investigation of the injurious effects of nitrate of soda and other salts on field crops, and meteorological observations. Some of the experiments have been conducted a series of years. The station publishes annual reports of its work for free distribution.

Analytical Laboratory, Ghent.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—P. Nyssens, *Dir.;* four assistants; a clerk.

Origin.—Established in 1875 by the Association for the Founding of Experiment Stations in Belgium; came under State control in 1883.

Equipment.—A laboratory building containing two analytical rooms, balance room, workroom, office, and parlor. The chemical laboratories are fitted with special ventilating apparatus by which the air in the rooms is kept at a greater pressure than that outside. In the dwelling occupied by the janitor is a room for microscopic work and a bacteriological laboratory.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing. In addition to this general work the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who

have accepted the control of the State laboratories; and it participates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Analytical Laboratory, Hasselt.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—Mercier, *Dir.;* two assistants, and a clerk.

Origin.—Established in 1878 by the Association for the Founding of Experiment Stations in Belgium; came under State control in 1883.

Equipment.—Laboratory building, containing a balance room, analytical laboratory with room and equipment for two chemists, laboratory for distillations, sugar-beet laboratory, workroom, library, office, and a public room for consultations.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing. In addition to this general work the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who have accepted the control of the State laboratories; and it participates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Analytical Laboratory, Liège.

Governing board.—Department of Agriculture and a local committee of four members.

Station staff.—De Molinari, *Dir.;* a chief of the division of chemistry; a chief of the division of microscopy; six assistants.

Origin.—Founded in 1878 by the Association for the Founding of Experiment Stations in Belgium; came under State control in 1883.

Equipment.—An analytical laboratory building, containing the office of the director, balance room, large analytical laboratory with provision for four chemists, laboratory for the analysis of sugar beets, workroom, and glass house. In a separate building is the division of microscopy, which is provided with a workroom, room for microscopic work, dark room, culture room, and glass house.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing. In addition to this general work the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who have accepted the control of the State laboratories; and it participates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Analytical Laboratory, Louvain.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—J. Graftiau, *Dir.;* three assistants.

Origin.—Founded in 1883 as a private laboratory by P. Claes, who became director of the laboratory when it was purchased by the State in 1885.

Equipment.—In 1898 a laboratory building was erected and fully equipped with electric lights and motors, gas, and modern apparatus. In the basement of this building are found apparatus for blowpipe analysis, machinery for the preparation of samples, dry kiln, and apparatus for the distillation of water and rectification of alcohol and other residues. On the first floor are found the office of the director, library, photographic laboratory, analytical laboratory, a special research laboratory, and a room for balances, microscopes, and polariscope. In addition to the ordinary equipment the laboratory contains a complete installation for electrical analysis. An experimental field is also available for the use of the staff.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing; investigations in the preparation of wine, cider, and mead; studies in vegetable physiology as applied to agriculture, and especially to kitchen gardening.

Analytical Laboratory, Mons.

Governing board.—Department of Agriculture and a local committee of five members.

Station staff.—Fl. Warsage, *Dir.;* four assistants, and a clerk.

Origin.—Founded in 1885 by the State.

Equipment.—The laboratory building contains the office of the director, which is furnished with microscopes and other optical apparatus; a room for balances and other apparatus and samples; the laboratory proper, which contains three rooms—the first provided with equipment and room for five chemists, the second serving as a room for the preparation of samples and as a laboratory for distillations, and the third equipped with hoods and apparatus for distilling acids. A structure for the storing of explosives and other dangerous substances is completely isolated from the laboratory.

Income.—Maintained by grants from the Department of Agriculture.

Lines of work.—Analysis of soils, fertilizers, foods, feeding stuffs, and agricultural products; seed testing. In addition to this general work the station performs two special duties: It verifies, gratuitously for the purchaser, merchandise sold by manufacturers and dealers who have accepted the control of the State laboratories; and it partici-

pates concurrently with other laboratories in the analysis of samples taken in execution of the regulations governing the trade in feeding stuffs.

Provincial Agricultural Laboratory, Roulers.

Governing board.—A committee of six appointed by the Provincial Council of West Flanders. J. Bethune, *Pres.*

Station staff.—Jules van den Berghe, *Dir.;* R. Castelein, *Asst.;* helpers, and a clerk.

Origin.—Established in 1874 by the Provincial Council of West Flanders on the initiative of the provincial committee of agriculture.

Equipment.—A laboratory with ten adjoining rooms, all of which are conveniently arranged and well equipped with scientific instruments and apparatus, gas, water, motor power, and a library of 400 volumes.

Income.—Subsidies from the State and the province amounting, in 1902, to $2,702.

Lines of work.—Analysis and control of feeding stuffs and foods, seed testing, and the examination of agricultural products. Reports of the work are published regularly in special bulletins and in magazines.

Agricultural and Hygienic Laboratory, St. Nicolas.

Castille, *Dir.*

Garden of the Society for Vegetable Culture, St. Nicolas.

Staff.—C. Amelinckx, *Dir.*

The Society for Vegetable Culture of St. Nicolas established in 1890 a station for practical experiments to improve old methods of culture. The equipment of the station consists of a number of vegetation cases and a garden. The station is subsidized by the Government and by the town of St. Nicolas. The lines of work include tests of new varieties of legumes and garden vegetables and experiments with various chemical fertilizers. Annual reports of the work are made to the Ministry of Agriculture and published in *Bulletin de l'Agriculture* (*Bruxelles*).

BOSNIA AND HERZEGOVINA.

Agricultural and Horticultural Stations.

The agricultural stations and the fruit and vine culture stations of Bosnia and Herzegovina are not experiment stations such as we find in western Europe and the United States. Rather, they are model farms intended to instruct farmers, stock raisers, and fruit growers of the vicinity in modern methods. At each station except the one at Lastva, provision is made for students, ten or twelve of whom spend two or three years on the farm learning the practical methods in vogue

there. In addition each station serves as a center for the distribution of seeds, fruit trees, and cuttings of improved varieties, and for the breeding of pure-bred stock that may be used by the stock raisers of the region for the improvement of the flocks and herds.

The stations were organized by the Provincial Bureau of Agriculture and are under its immediate control. Each station has a manager trained in the theory and practice of farming and capable of giving instruction not only to the pupils in his charge, but also to the farmers and fruit growers of the region.

Station for Fruit and Vine Culture, Dervent.

Established in 1888. The area under cultivation includes 156 acres, of which 24 acres are in nursery, 101 acres orchard, 21 acres vineyard, and 4 acres set to American varieties of phylloxera-resistant vines, from which cuttings are distributed among the vine growers of the region. The station building contains an office, apartments for the manager, press room, and wine cellar. There are also a school building, a machine shop, and stables. This station is more largely engaged in the growing of stone fruits and apples and pears than any of the other fruit stations, but it also devotes considerable time and space to the production of grapes for wine and for table use and to the propagation of early varieties for cool climates.

Agricultural Station, Gacko.

Established in 1886. This station includes three farms—a valley farm of 647 acres, more than three-fifths of which is in pasture and meadow; a mountain farm at Zelengora of 731 acres, of which 621 acres are in woodland and pasture, and a mountain pasture of 230 acres at Nikolin dô. At the valley farm the buildings are of stone and include a dwelling, cheese-making room, cheese cellar, stables, etc. On both mountain farms there are dwellings and the necessary stables for housing the live stock. These farms lie in a grazing country, and stock raising, dairying, and cheese making from the milk of both cows and sheep are given much more attention than the cultivation of field crops.

Agricultural Station, Ilidže.

Established in 1893. The station includes both valley and mountain farms, the former including 406 acres of cultivated land, the latter 1,577 acres, most of which is in pasture and woodland. The station building at Ilidže contains apartments for the manager, office, and schoolroom. There are also barns, a thrashing building, a greenhouse, hothouses, 60 cows, 300 fowls, and other domestic animals. While stock raising is given an important place at this station, much more attention is given to the cultivation of crops, and especially the production of fodder, than at any of the other stations.

Station for Fruit and Vine Culture, Lastva.

Established in 1894. Of the 95 acres under cultivation at this station 72 acres are in vineyard and 12 acres in orchard. The station buildings are very similar to those at Dervent, except that there is a building for the accommodation of families who attend the winter school. The work of the station includes the improvement of methods of vine culture and of wine making, the production of other fruits and nuts, and the conducting of a winter school for the vine and fruit growers of the region.

Agricultural Station, Livno.

Established in 1888. The valley farm at Livno has an area of 1,592 acres, of which 1,012 acres are meadow and pasture land. The buildings include a two-story stone building containing living apartments, office, and schoolroom; 3 large cattle barns, sheep barn, poultry house, pigpens, stables for the work animals, cheese-making room, cheese cellar, and a natural cave for curing Roquefort cheese. There are on the farm 200 cows, 1,500 sheep, 30 swine, 500 fowls, and a few Angora goats, beside work animals. There are 2 mountain farms, which together cover an area of 6,592 acres, of which 5,992 acres are in meadow and pasture. At these farms also facilities are provided for making and curing cheese. This station is located in the grazing district and gives little attention to the cultivation of field crops. Dairying, cheese making, the improvement of live stock, and the acclimatization of Angora goats are the principal lines of work undertaken.

Agricultural Station, Modric.

Established in 1886. The farm has an area of 816 acres, nearly all of which is cultivated. Among the buildings are the dwelling of the manager, a school building, barns, graneries, etc. This farm lies in a rich agricultural district and is conducted as a model farm for rational field culture, stock raising, and general farming.

Station for Fruit and Vine Culture, Mostar.

Established in 1888. The vineyard at this station covers 41 acres and the orchard 12 acres. The station building contains an office, apartments for the manager, press room, and wine cellar. Adjoining is a school building and a machine room. Attention is given to the growing of grapes, fruits, and nuts, wine making, and the study of diseases and pests of the vine.

BRAZIL.

Agricultural Institute of São Paulo, Campinas.

Governing board.—Under the direction of the Secretary of Agriculture, Commerce, and Public Works.

Station staff.—Dr. Gustavo R. P. d'Utra, *Dir.;* H. Potel, *1st Chem.;* A. Hempel, *Veg. Path.;* R. Bolliger, *Met. and 2d Chem.;* E. Sixt, *3d Chem.;* R. E. de Paula Aragão, *Pract. Chem.;* Dr. J. A. Requião, *Agr.;* T. Egydio de Souza Aranha, *Sec.;* farm superintendent; chief gardener; 4 gardeners; 2 laboratory helpers; 2 foremen; 12 workmen.

Origin.—Established by the Brazilian Ministry of Agriculture in 1887; definitely organized in 1898; transferred to the State of São Paulo in 1892.

Equipment.—Laboratory buildings, including analytical laboratories, a laboratory for vegetable pathology, and a separate building for the analysis of seeds and fertilizers; experimental garden and vegetation house at Guanabara; experimental field and coffee plantation at Taquaral, and an experimental farm at Santa Elisa.

Income.—The income is derived largely from the sale of agricultural products and from the analysis of commercial products. In 1903 the total income was about $38,000.

Lines of work.—Experiments with native grasses and other forage crops; cultural and manurial experiments with sugar cane and coffee; experiments with various drying machines in curing coffee; investigation of the cost of producing agricultural crops; study of plant diseases; analysis of soils, fertilizers, and drinking water; meteorological observations; cooperative experiments in various parts of São Paulo. The work of the station is published in the *Boletim da Agricultura.*

Agricultural Institute, Itabira, Minas Geraes.

The institute was founded in 1895 by the late director, Dr. C. Brunnemann.

Botanic Garden, San Vicente, São Paulo.

Station staff.—Dr. J. Campos Porto, *Dir.*

In 1900 the municipal government of Santos established near the village of San Vicente a botanical garden and experimental and demonstration field.

Experimental and Demonstration Field of the Cultivators' Club (Club da Lavoura), São Carlos.

Governing board.—Auxiliary council of the Cultivators' Club.

Station staff.—Antonio Gomes Carno, *Dir.*

The Cultivators' Club proposes to introduce new methods of culture and new machinery among the farmers of São Paulo, and to aid in this work has established near São Carlos an experimental and demonstration field, and also conducts cooperative experiments on farms in various parts of the State.

Botanic Garden, Tramway da Cantareira, near São Paulo.

Governing board.—Under the direction of the Secretary of Agriculture, Commerce, and Public Works of São Paulo.

Staff.—Dr. Alberto Löfgren, *Dir.;* Thomas Rosetti, *Asst.;* A. Hammar, *Met. and Ent.;* a gardener.

Origin.—Founded by the Geographical and Geological Commission of São Paulo in 1896, but not fully established until 1899.

Equipment.—A small laboratory, cold frames, and convenient house for orchids and other shade-loving plants, and about 50 acres under cultivation.

Income.—Derived entirely from the Government subsidy of $2,600.

Lines of work.—Scientific botanical investigations relating to the flora of São Paulo; the propagation and culture of economic trees—those useful in the production of lumber, fuel, and charcoal; distribution of seeds, and the acclimatization of exotics. A pomological section for the introduction, hybridization, and distribution of American and European fruits has recently been established.

BRITISH EAST AFRICA.

Botanic Station, Uganda, East Africa Protectorate.[a]

Alexander Whyte, *Bot.*

Agricultural Department, Dunga, Zanzibar.

Robert Nunez Lyne, *Dir. of Agr.*

The Agricultural Department of Zanzibar was established in 1896. It maintains an experiment station at Dunga where experimental plantations of various tropical products, such as cloves, cocoanuts, and rubber trees have been established. The department derives its income from the sale of products from these plantations. Its principal lines of work are the cultivation of new products, including vanilla, Liberian coffee, cacao, kola, and rubber; the improvement of native methods of cultivation; the training of natives; the study of native products; and meteorological observations.

Experiment Station, Dunga, Zanzibar.[a]

W. Buzzacott, *Supt.*

Victoria Gardens, Zanzibar.[a]

W. Buzzacott, *Cur.*

BRITISH GUIANA.

Division of Science and Agriculture.

Included under this division are three organizations: The Board of Agriculture, comprising administrative officers and a number of experts; the Government Laboratory, and the Botanic Gardens.

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[a] See Royal Gardens, Kew, p. 161.

Board of Agriculture.

Staff.—Hon. A. M. Ashmore, *Chair.;* Prof. J. B. Harrison, M. A., *Chair. in charge of Agr. Expts.;* O. Weber, *Sec.;* R. Ward and J. E. Beckett, *Agr. Assts. and Instrs.;* J. A. Raleigh, *Vet. Surgeon.*

Income.—For 1902, $10,628 from the local government.

Government Laboratory.

Staff.—Prof. J. B. Harrison, M. A., *Govt. Analyst and Prof. of Chem.;* E. W. F. English, M. A.; J. Williams; W. P. Kaufmann, M. A.; P. V. Garraway, *Assts.*

Income.—For 1902, $8,780 from the local government.

Botanic Gardens and Sugar Cane Experiments.[a]

Staff.—Georgetown: A. W. Bartlett, *Supt.;* J. F. Waby, *Head Gard.;* F. W. B. Carter, *Asst. Gard.* Berbice: J. Nardamoonie, *Keeper;* J. B. Harrison, *Chem. in charge of Sugar Cane Expts.*

Income.—For 1902, $15,860.

Origin.—The Government Laboratory was originally established by the local government for the purposes of agricultural research in 1850, under the charge of the late Doctor Sheir. After some years it was discontinued but was reestablished in 1879, and has since been actively engaged in tropical agricultural research.

The Botanic Gardens were established in 1878, mainly for the purpose of aiding in the development of the agricultural resources of the colony.

The Board of Agriculture was established in 1901 as a governing board to have charge of the Botanic Gardens and other scientific staffs of the colony.

Equipment.—Three well-equipped laboratories; vegetation houses; botanic gardens at Georgetown, Demerara, and at New Amsterdam, Berbice; experiment fields in Demerara and Essequibo.

Lines of work.—Investigations in tropical agriculture, especially with sugar cane, rice, cacao, and coffee; analysis of soils, manures, and sugar products; cultivation of flowers and ornamental plants and many economic tropical products; practical investigations in connection with cooperative experiments with planters; the importation and exchange of live stock, seeds, and plants.

BRITISH HONDURAS.

Botanic Station, Belize.[a]

Governing board.—The colonial government of British Honduras.

Station staff.—Eugene J. F. Campbell, *Cur.*

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[a] See Royal Gardens, Kew, p. 161.

Origin.—First promoted in 1882 by Sir Joseph Hooker, then director of the Kew Gardens; finally established in 1892.

Equipment.—Nurseries containing economic plants.

Income.—About $250 from the colonial government.

Lines of work.—Introduction of valuable economic and fruit plants; instruction to planters on agricultural matters.

BRITISH WEST INDIES.

Imperial Department of Agriculture, Barbados.[a]

Dr. Daniel Morris, *Comr.;* W. R. Buttenshaw, *Sci. Asst.;* L. Lewton-Brain, *Myc. and Agr. Lect.;* Henry A. Ballou, *Actg. Ent.;* A. G. Howell, *Chief Clerk;* Francis Watts, *Govt. Analyt. and Agr. Chem. for the Leeward Islands.*

The Imperial Department of Agriculture was organized in 1898. Its duties are "(1) to endeavor to restore the sugar industry to a condition in which it can be profitably carried on, and (2) to encourage the establishment of other industries in such colonies as afford suitable conditions to supplement the staple industry." The commissioner, Dr. Daniel Morris, has charge of all experiment stations in the British West Indies except those on the islands of Jamaica and Trinidad.

The Imperial Department of Agriculture has established on the Island of Barbados two central experiment stations and ten local plantations for the improvement of varieties and the carrying on of fertilizer experiments. The varieties that prove most promising at the central stations are tested at the local plantations to determine their adaptability and value in different soils and localities and also to demonstrate their value to the planters in each parish. The other stations now under the control of the department are those at Tobago, Grenada, St. Vincent, St. Lucia, Dominica, Montserrat, Antigua, Tortola, and St. Kitts-Nevis; the two stations in British Guiana, and one in British Honduras. In addition there are twenty substations or experimental plats at Grenada, St. Vincent, St. Lucia, and Dominica; seven at Antigua, and three at St. Kitts-Nevis, which have been established to encourage improvements in the cultivation of cacao, coffee, limes, and other crops. The expense of maintaining these stations is borne by the British Government, which appropriated $21,900 for the new department in 1899, and estimated that during the next ten years an annual grant of about $85,000 would be required. The Imperial Department of Agriculture publishes handbooks, leaflets, agricultural news, and the *West Indian Bulletin*, which is sent free to residents of the West Indies.

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[a] See Royal Gardens, Kew, p. 161.

Botanic Station and Sugar Cane Experiments, Antigua.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—W. H. Patterson, *Cur.;* Francis Watts, *Chem. in charge of Sugar Cane Expts.*

The station was established in 1890, and has recently organized, under the direction of Doctor Morris, seven substations. The attention of the station has been directed almost exclusively to the economic and agricultural interests of the colony, especial attention being given to experiments with grapevines, fibers, cotton, tobacco, pineapples, etc.; cultivation of varieties of sugar cane; distribution of new economic plants and seeds; manurial experiments, and the improvement of fruit.

Botanic Station and Sugar Cane Experiments, Dodd's Reformatory, Barbados.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—John R. Bovell, *Supt. of Bot. Sta.;* J. P. d'Albuquerque, *Island Chem. and Agr. in charge of Sugar Cane Expts.;* four assistants.

Experiments at this place were begun in 1885 and since that time have been continued along a few well-defined lines. At present the station is investigating the composition of the rainfall and conducting field experiments with manures on established varieties of sugar cane and comparative experiments with seedling varieties of sugar cane. The more promising varieties are tested at other local stations on the island. The analytical work is done in the laboratories at Dodd's Reformatory, and annual reports of all the work are published. There are at present on the Island of Barbados eleven central and local stations associated with this station and doing similar work.

Botanic Station, Dominica.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—Joseph Jones, *Cur.;* George F. Branch, *Agr. Instr.;* J. F. Baptiste, *Form.*

Income.—Four thousand eight hundred and sixty-six dollars and fifty cents from the Imperial Department of Agriculture.

The station was established by the curator in 1890, and includes 40 acres of land upon which large nurseries of economic plants are maintained. Plat experiments with sugar cane, Liberian coffee, vanilla, cacao, cinnamon, oranges, limes, and other tropical productions receive the attention of the station authorities.

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[a] See Royal Gardens, Kew, p. 161.

Botanic Station, Grenada.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—W. E. Broadway, *Cur.;* W. M. Smith, *Actg. Agr. Instr.;* A. W. Dowers, *Form.*

This station was established by the local government in 1886, upon the advice of Doctor Morris, then assistant at the Kew Gardens. It was maintained at the expense of the government of Grenada until October, 1898, when it was transferred to funds controlled by the Imperial Department of Agriculture. It is engaged in introducing and testing new economic and ornamental plants, in giving practical information and advice on agricultural and horticultural topics, and in distributing economic and ornamental plants throughout the colony

Board of Agriculture, Kingston, Jamaica.

Staff.—The Colonial Secretary, Hon. Sydney Olivier, *Chair.;* three members ex-officio; the director of the Department of Public Gardens and Plantations; the Imperial Commisioner of Agriculture for the West Indies; the Government analytical and agricultural chemist; and four members appointed by the governor, two of whom are nominated by the Agricultural Society.

Executive committee.—Composed of the superintendents of the several gardens and the Hope Experiment Station; the two assistant chemists; the traveling instructor in agriculture, and the lecturer in agriculture.

The Board of Agriculture was organized in 1900 to have general supervision over the Department of Public Gardens and Plantations and the Government Laboratory, to promote the establishment of experiment stations, and to aid generally in the dissemination of agricultural information. The first act of the board in promoting experiment stations was to extend the experimental plats at Hope Gardens and organize there an experiment station. The board has also purchased 86½ acres of the St. Jago estate for the purpose of finding employment for prisoners and of supplying food to the prisons and the public institutions in Kingston, with a view "of utilizing some part of this land for experiments and demonstrations in the cultivation of rice, cotton, cassava for making starch in bulk, and similar purposes, when sufficient provision has been made for the food supply of public institutions."

Department of Public Gardens and Plantations, Kingston, Jamaica.[a]

Station staff.—William Fawcett, *Dir.;* William Harris, *Asst. to Dir. and Supt. of Hope Gardens and Experiment Station, Castleton Gardens, and Hill Gardens (Cinchona);* Thos. J. Harris, *Agr. Instr.*

[a] See Royal Gardens, Kew, p. 161.

of Hope Experiment Station; John Campbell, *Asst. Supt. of Castleton Gardens;* James Briscoe, *Supt. of King's House Gardens;* William J. Thompson, *Supt. of Parade Gardens;* H. S. Hammond and E. J. Wortley, *Assts. Chem.;* T. F. Teversham, *Lect. in Agr. Sci.;* William Cradwick, *Traveling Instr. in Agr.*

The Department of Public Gardens and Plantations maintains gardens at Hope, Castleton, Cinchona, Parade, and King's House. These gardens are engaged in the cultivation of coffee, cinnamon, cacao, sugar cane, and other tropical plants and fruits, and in the importation and exchange of plants and seeds. Annual reports of the department and the Bulletin of the Department of Agriculture are published.

Hope Experiment Station, Kingston, Jamaica.

Governing board.—The director of the Department of Public Gardens and Plantations, subject to the direction and control of the Board of Agriculture of Jamaica.

Station staff.—William Harris, *Supt.;* T. J. Harris, *Agr. Instr.*

Origin.—Experimental work at the Hope Gardens was begun in 1874. Subsequent to the organization of the Board of Agriculture in 1900, this work was extended and the experiment station was organized as one of the institutions comprising the Department of Public Gardens and Plantations.

Equipment.—Experiment plats, covering 25½ acres. A reservoir for irrigating purposes is being constructed at a cost of $1,460.

Income.—Derived from the grant to the Department of Public Gardens and Plantations. For the fiscal year ended March 31, 1902, the expenditures, exclusive of salaries, amounted to $1,856.

Lines of work.—Variety tests of sugar cane, bananas, pineapples, and citrus plants; tobacco growing and curing, including experiments with Sumatra leaf; variety, fertilizer, cultural, and pruning experiments with cocoa; tests of varieties and demonstrations of manuring and pruning coffee; study of methods of grafting and other problems in growing nutmeg, rubber, and other economic plants; green-manuring experiments; local manurial experiments in cooperation with planters in different parts of the island.

Experiment Stations, Montserrat. [a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—A. J. Jordan, *Agr. Instr.;* Dudley Johnson, *Local Instr.*

Origin.—Founded in 1900 by the Imperial Department of Agriculture.

Equipment.—Twelve acres of inclosed land, with covered nurseries,

[a] See Royal Gardens, Kew, p. 161.

office, storerooms, etc. The land is located at three different points on the island, each parcel being designated a station, viz: Grove station (A. D. Dyer, *Form.*), Olveston station (Wm. Shoy, *Sub Form.*), and Harris station (F. Donoghue, *Sub Form.*).

Income.—For 1901–2, $3,448.71 (Imperial Department of Agriculture, $3,295.37; sale of plants, $153.34).

Lines of work.—Introduction and distribution of economic plants, practical experiments with crops, improvement of live stock by the importation of good breeds, introduction of improved farm implements, establishing of school gardens, agricultural instruction.

Botanic Station and Sugar Cane Experiments, St. Kitts-Nevis.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—F. R. Shepherd, *Actg. Cur.;* Francis Watts, *Chem. in charge of Sugar Cane Expts.*

This station is engaged in raising and distributing economic plants and in experiments for the improvement of sugar cane.

Botanic Station, St. Lucia.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—J. C. Moore, *Agr. Supt.;* G. S. Hudson, *Agr. Instr.;* Elias Buckmire, *Form.*

The station was established in 1887 and transferred to the control of the Imperial Department of Agriculture in 1898. It is engaged in the distribution by sale, free grants, and exchange, of plants and seeds of economic value and suitable for cultivation in the colonies, and in the cultivation of Liberian coffee, nutmegs, ginger, cacao, and other tropical productions. The agricultural instructor travels about the island to advise planters and superintend work on experiment plats.

Botanic Station, St. Vincent.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—W. N. Sands, *Agr. Supt.;* Thomas Osment, *Agr. Instr.;* J. B. Dopwell, *Form.*

Origin.—The old Botanic Garden of St. Vincent was established by the British Government in 1765, but was given up in 1822 and the land transferred to the local government. "In the course of time (about 1849) the garden ceased to be cultivated, attention being given only to the gathering of the spices and fruit, but in May, 1890, it was reestablished by the Imperial Department of Agriculture of the West Indies."

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[a] See Royal Gardens, Kew, p. 161.

Lines of work.—Introduction and distribution of plants of economic importance, such as cacao, coffee, and sugar cane.

Botanic Station, Tobago.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—J. H. Hart, *Supt.;* Henry Millen, *Cur.;* N. Lord, *Agr. Instr.;* J. Blackman, *Form.*

This station was established in 1899. It is subordinate to the Royal Botanic Gardens at Trinidad, and the 18 acres under cultivation are devoted to experiments with sugar cane, cacao, yams, tobacco, coffee, and rubber, which promises to become an important product in Tobago. The income of the station for the year ended March 31, 1903, was $170.10.

Experiment Station, Tortola, Virgin Islands.[a]

Governing board.—Imperial Department of Agriculture, Barbados.

Station staff.—W. C. Fishlock, *Agr. Instr.;* William Haynes, *Form.*

Origin.—Founded in 1900 by the Imperial Department of Agriculture.

Equipment.—Sugar mill with evaporators and other improved apparatus, meteorological apparatus, and about 60 acres of land for experimental purposes.

Income.—An annual grant of $2,481.92 voted by the Imperial Parliament, London.

Lines of work.—Experiments with sugar cane, cacao, coffee, pineapples, and other food and fruit crops; fertilizer experiments; stock breeding.

Botanic Department, Trinidad.

The Botanic Department has charge of two establishments, the Royal Botanic Gardens[a] and the St. Clair Experiment Station, together with the care of ornamental trees on all "government pastures" in the vicinity of Port of Spain.

Staff.—J. H. Hart, *Supt.;* F. J. Evans, *Asst. Supt.;* William Leslie, *Senior Agr. Instr.;* H. A. Nurse, *Junior Agr. Instr.;* J. Bailey, *Head Gard.* (Govt. House); H. C. Massy, *Clerk;* J. C. Augustus, *Form.* (St. Clair); P. McLean, *Herbarium Asst.*

Origin.—The Royal Botanic Gardens were established in 1818; the St. Clair Experiment Station in 1898. Substations are being established.

Equipment.—Botanic gardens, herbarium, library, experimental plats covering 35 acres at St. Clair, and including a nursery containing 40,000 or 50,000 plants.

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[a] See Royal Gardens, Kew, p. 161.

Income.—Maintained entirely by the government of Trinidad.

Lines of work.—The experiment station is divided into three sections: (1) Fruit, (2) botanical and ornamental, and (3) nurseries and economics. The last section is the largest and contains plats devoted to experiments with seedling canes, rubber, coffee, cacao, vanilla, pepper, tobacco, kitchen garden produce, forest trees, etc. Besides these experimental enterprises, courses of lectures in agriculture are held at intervals for the instruction of students. Annual reports are published and a bulletin is issued containing miscellaneous information and records of experiments.

BULGARIA.

Experiment Field of the Agricultural School, Plevna.

B. Manoucheff, *Dir.*

Experiment Field of the Agricultural School, Rustchuk.

Nikola Batchvaroff, *Dir.*

Experiment Field of the Agricultural School, Sadova.

Athanase Kablechkoff, *Dir.*

CANADA.

Department of Agriculture, Ottawa.

Hon. Sidney A. Fisher, *Minis. of Agr.*

The Dominion system of experiment stations comprises a central experimental farm at Ottawa and four branch farms located in different provinces and territories. These farms were established by the Department of Agriculture and receive annual grants from the department, which also publishes their annual reports. The department is represented in all its transactions with the experimental farms by the director of experimental farms, who resides upon and has immediate control of the central farm in Ottawa, and is represented by a superintendent at each of the branch farms. These are the only experimental institutions under the control of the Dominion Department of Agriculture, but not the only institutions doing experimental work in the Dominion. The Province of Ontario supports an agricultural college and experimental farm at Guelph, with which are connected a large number of cooperative enterprises, all of which are subordinate to the provincial department of agriculture, and several of the other provinces and territories in the Dominion maintain departments of agriculture, with which are connected experts and inspectors engaged in control work.

Central Experimental Farm, Ottawa.

Governing board.—The Dominion Department of Agriculture, Hon. Sidney A. Fisher.

Station staff.—Dr. William Saunders, *Dir.;* J. H. Grisdale, *Agr.;* W. T. Macoun, *Hort.;* F. T. Shutt, *Chem.;* Dr. James Fletcher, *Ent. and Bot.;* A. G. Gilbert, *Poultry Mgr.*

Origin.—Established in 1887. In connection with the Central Experimental Farm there are four branch farms located in widely separated parts of the Dominion, all of which are under the direction of Doctor Saunders. The branch farms are at Nappan, Nova Scotia; Brandon, Manitoba; Indian Head, Assiniboia; and Agassiz, British Columbia.

Equipment.—Office building, chemical laboratory, and museum; conservatory and houses for seed testing and seed distribution; barn; implement shed and tool house; piggery; dairy building; root house; sheep house; poultry buildings and yards; farm containing orchards and numerous experimental plats, and a large number of farm animals.

Income.—Budget for 1900–1901, $40,369.24.

Lines of work.—Variety tests and other experiments with oats, barley, spring and winter wheat, peas, Indian corn, root crops (including sugar beets), fodder plants, fruits, etc.; rotation experiments; dairy experiments; spraying, cultural, and acclimatization experiments with large and small fruits; seed testing; feeding experiments with horses, cattle, swine, and sheep; experiments with green manures, fertilizers, and means for conserving soil moisture; investigations in economic entomology; experiments in apiculture and poultry raising; meteorological observations, and analysis of fertilizers, feeding stuffs, foods, soils, well waters, dairy products, insecticides, fungicides, etc. Bulletins and annual reports are published.

Branch Experimental Farms.

Experimental Farm for British Columbia, Agassiz, British Columbia.

Governing board.—The superintendent reports to Dr. William Saunders, director of the experimental farms.

Station staff.—Thomas A. Sharpe, *Supt.*

Origin.—Established in 1889.

Equipment.—Residences for superintendent and foreman, barn, farm of 1,125 acres, extensive orchards, 6 horses, 20 head of cattle, 22 swine, 9 sheep, fowls, bees, farm implements, machinery, etc.

Income.—Budget for 1900–1901, $8,799.02.

Lines of work.—Variety tests with cereals, flax, root crops, large and small fruits; experiments with fodder plants, mixed grains for

feed, and grasses; fertilizer experiments; forestry experiments, and meteorological observations. Experiments with fruit are given great prominence.

Experimental Farm for Manitoba, Brandon, Manitoba.

Governing board.—The superintendent reports to Dr. William Saunders, director of the experimental farms.

Station staff.—S. A. Bedford, *Supt.*

Origin.—Established in 1887.

Equipment.—Superintendent's house, barn, poultry house, and other farm buildings, farm of 652 acres, 12 horses, 22 head of cattle, 26 swine, bees, farm implements, machinery, etc.

Income.—Budget for 1899–1900, $15,434.62.

Lines of work.—Variety tests and cultural experiments with spring wheat, barley, oats, peas, flax, Indian corn, root crops, legumes, garden vegetables, flowers, and ornamental shrubs; rotation experiments; feeding experiments with cattle, swine, and poultry; experiments with sand binders and with varieties of large and small fruits; forestry experiments and meteorological observations.

Experimental Farm for the Northwest Territories, Indian Head, Assiniboia.

Governing board.—The superintendent reports to Dr. William Saunders, director of the experimental farms.

Station staff.—Angus Mackay, *Supt.*

Origin.—Established in 1887.

Equipment.—Superintendent's house, barns, farm of 682 acres, 13 horses, 36 head of cattle, swine, fowls, bees, farm implements, and machinery.

Income.—Budget for 1899–1900, $12,083.96.

Lines of work.—Variety and fertilizer experiments with spring wheat, oats, barley, peas, Indian corn, and other farm and garden crops; rotation experiments; experiments with flowers, ornamental trees, shrubs, forest trees, and fruits; feeding experiments; experiments with brome grass and various grass mixtures to prevent the drifting of soil, and meteorological observations.

Experimental Farm for the Maritime Provinces, Nappan, Nova Scotia.

Governing board.—The superintendent reports to Dr. William Saunders, director of the experimental farms.

Station staff.—R. Robertson, *Supt.;* W. S. Blair, *Hort.*

Origin.—Established in 1887.

Equipment.—Superintendent's house, barn, and other farm buildings, farm containing 300 acres, 7 horses, 47 cattle, 70 swine, 49 sheep, fowls, bees, farm implements, machinery, etc.

Income.—Budget for 1899–1900, $15,326.66.

Lines of work.—Rotation experiments; variety tests with cereals, root crops, legumes, hay and fodder crops; feeding experiments; investigation of various spraying mixtures; experiments with fruits and garden vegetables, and meteorological observations.

Experimental Farm, Compton (Quebec).

J. M. Lemoyne, *Dir.*

Ontario Agricultural College and Experimental Farm, Guelph.

Governing board.—The president of the college reports directly to the Provincial Minister of Agriculture, Hon. John Dryden.

Station staff.—Geo. C. Creelman, *Pres.;* H. H. Dean, *Dairy Husb.;* C. A. Zavitz, *Expt.;* J. Hugo Reed, *Vet.;* G. E. Day, *Agr. and Farm Supt.;* H. L. Hutt, *Hort.;* J. B. Reynolds, *Phys. and Lect. in Engl.;* F. C. Harrison, *Bact. and Libr.;* W. Lochhead, *Biol. and Geol.;* R. Harcourt, *Chem.;* W. R. Graham, *Mgr. and Lect. Poultry Dept.;* H. R. Rowsome, *Lect. in Apiculture;* M. W. Doherty, *Assoc. Biol.;* W. P. Gamble, *Assoc. Chem.;* M. Cumming, *Assoc. Agr.;* W. J. Rutherford, *Dean of Residence and Lect. in Engl. and Math.;* H. Streit, *Asst. Bact.;* W. C. Good, *Asst. Chem.;* Alice Rowsome, *Asst. Libr. and Instr. in French and German;* T. D. Jarvis, *Fellow in Biol.;* G. B. McCalla, *Fellow in Phys.;* P. W. Hodgetts, *Fellow in Hort.;* Capt. Walter Clark, *Drill and Gymnastics;* S. Springer, *Bursar;* B. S. Pickett, *Sec.;* Annie Hallet, *Sten.;* F. K. Dougherty, *Dept. Sten.;* W. O. Stewart, *Physician.*

Origin.—The college was founded in 1874.

Equipment.—College laboratories, greenhouses, stables, poultry buildings, cheese factory, creamery, etc., and farm of 550 acres, of which nearly 50 acres are divided into about 2,000 experiment plats.

Income.—Budget for college and farm in 1901, $88,752.03. Of this amount, $24,756.36 was received from fees, sale of products, etc., and the remainder, $63,995.67, was provided by the Government.

Lines of work.—Experiments in butter making, cheese making and curing, feeding cattle, sheep, and swine, and feeding and rearing poultry; experiments with varieties of grain, root, tuber, grass, clover, fodder, silage, and miscellaneous crops; with artificial, green, and farmyard manure; with methods of cultivation, selection of seed, dates of seeding, etc.; with varieties of berries, currants, tomatoes, flowers, and bedding plants; analysis of sugar beets, dairy products, fertilizers, and farm crops; investigation of plant and animal diseases, foul brood in bees, and the bacteriology of butter making and cheese making.

Ontario Agricultural and Experimental Union, Guelph.

Governing board.—Board of Control: T. G. Raynor (*Pres.*), *Rosehall;* Nelson Monteith (*V.-Pres.*), *Stratford, Ont.;* C. A. Zavitz (*Sec. and Editor, Agr. College*), *Guelph;* H. L. Hutt (*Treas. Agr. College*), *Guelph;* James Mills, G. C. Creelman, Thomas Mason, E. C. Drury, and L. S. Klinck, *Dirs.*

Staff.—The following directors of experimental work, who are assisted by other members of the Union: C. A. Zavitz, *Agr.;* Prof. H. L. Hutt, *Hort.;* Prof. William Lochhead, *Econ. Bot., and Ent.;* W. R. Graham, *Poultry.*

Origin.—The Union was organized in 1880. A definite system of cooperative experimental work was arranged in 1884. The Union conducts a large number of cooperative experiments in all parts of the province, for which it furnishes materials free of cost to the farmer and exacts reports at the end of the season. In 1886 twelve experimenters participated in this work, and in 1902 the number reached 3,787, representing every county and district in Ontario.

Income.—For 1902, $1,550 (Government grant, $1,400; membership fees, $150).

Lines of work.—Cooperative experiments mostly variety tests, with varieties that have proved valuable at the Ontario Agricultural College. In 1902 these experiments (variety tests and other experiments) included the following: Agricultural experiments with grain, root, forage, fodder, silage, and hay crops, garden vegetables, and fertilizers; horticultural experiments with gooseberries, currants, blackberries, raspberries, and strawberries; entomological experiments in cooperation with the Ontario Fruit Experiment Stations; experiments in economic botany, soil physics, poultry raising, forestry, and beekeeping. The results of successfully conducted experiments are printed annually by the Department of Agriculture, Toronto, Ontario, and the reports distributed free.

Ontario Fruit Experiment Stations.

Governing board.—Representing the college: G. C. Creelman, *Guelph;* H. L. Hutt, *Guelph.* Representing the Ontario Fruit Growers' Association: Hamilton Pettitt, *Grimsby;* W. M. Orr, *Fruitland;* W. H. Bunting, *St. Catharines;* Linus Woolverton, *Grimsby.*

Executive committee.—James Mills, *Chair.;* Linus Wolverton, *Sec.;* H. L. Hutt, *Official Visitor.*

Through the cooperation of the Ontario Agricultural College and Experimental Farm and the Ontario Fruit Growers' Association, fifteen experimental fruit stations are maintained on private farms in different parts of the province. The name, location, special line of work, and experimenter in charge of each station are shown in the table which follows.

No.	Name.	Location.	Experimenter.	Specialty.
1	Southwestern	Leamington	W. W. Hilborn	Peaches.
2	Niagara	St. Catharines		Tender fruits.
3	Wentworth	Winona	Murray Pettit	Grapes.
4	Burlington	Freeman	A. W. Peart	Blackberries and currants.
5	Lake Huron	Walkerton	A. E. Sherrington	Raspberries and commercial apples.
6	Georgian Bay	Clarksburg	J. G. Mitchell	Plums.
7	Simcoe	Craighurst	G. C. Caston	Hardy apples and hardy cherries.
8	East Central	Whitby	R. L. Huggard	Pears and commercial apples.
9	Bay of Quinte	Trenton	W. H. Dempsey	Apples.
10	St. Lawrence	Maitland	Harold Jones	Hardy plums and hardy pears.
11	Strawberry substation.	Guelph	E. B. Stevenson	Strawberries.
12	Gooseberry substation.	Nantyr	Stanley Spillut	Gooseberries.
13		Grimsby	L. Woolverton	Cherries and general collection of fruits for descriptive work.
14	Algoma	Richards Landing	Charles Young	Hardy fruits.
15	Wabigoon	Dryden	A. E. Annis	Do.

Botanic Garden, Ottawa.[a]

Prof. John Macoun, *Dominion Bot.*

Provincial Farm, Truro.

Governing board.—B. W. Chipman, *Sec. of Agr.*

Staff.—F. L. Fuller, *Farm Mgr.*

Equipment.—Experimental farm with farm buildings, including a dairy house, farm machinery, about 44 head of cattle, 6 horses, 10 pigs, and a flock of poultry.

Lines of work.—Experiments with field crops for the purpose of testing improved varieties and various systems of rotation; experiments in breeding and feeding cattle, swine, and poultry, and fertilizer experiments.

Nova Scotia School of Horticulture, Wolfville.

Governing board.—Pres. J. W. Bigelow, of the Nova Scotia Fruit Growers' Association, and a committee of ten appointed by that association.

Staff.—F. C. Sears, *Dir.;* an assistant; a gardener.

Origin.—Founded in 1894 by the Nova Scotia Fruit Growers' Association.

Equipment.—A laboratory furnished with microscopes, bacteriological, chemical, and entomological apparatus; class room, library, greenhouse, garden of half an acre, and an orchard of 2 acres.

Income.—Two thousand dollars from the provincial treasury.

Lines of work.—Experiments with apples, pears, plums, cherries, peaches, nuts, and small fruits; also experiments in spraying, fertilizers for orchards, cover crops, pruning at different seasons, methods of preparing fungicides and insecticides, treatment of apple canker.

[a] See Royal Gardens, Kew, p. 161.

The director of the school also has joint oversight, with the Secretary of Agriculture, B. W. Chipman, of the model orchards which are being established in each county of the province. The appropriation for this work is $1,000 per annum, and three 2-acre orchards are to be established in each county. Fourteen have already been planted and are to be under government control for ten years, the nursery stock being furnished by the government and all labor performed by the owner of the land, who receives all crops raised in the orchard and at the expiration of ten years assumes full control.

CAPE OF GOOD HOPE.

Department of Agriculture, Cape Town.

Charles Currey, *Under Sec. of Agr.;* W. Hammond Tooke, *Asst. Under Sec., Chief Clerk, and Accounting Officer;* Duncan Hutcheon, V. S., *Colon. Vet. Surgeon;* nine assistant veterinary surgeons; P. MacOwan, D. Sc., *Govt. Bot. and Cur. of Govt. Herb.;* C. P. Lounsbury, B. Sc., *Govt. Ent.;* one assistant entomologist; J. D. F. Gilchrist, Ph. D., *Govt. Biol.;* A. G. Davison, *Chief Insp. of Sheep;* three agricultural assistants; F. D. MacDermott, *Editor Agricultural Journal;* four conservators of forests; a forest surveyor; inspectors of mines and claims; a superintendent of government guano islands, and a surveyor-general.

The Colonial Department of Agriculture is charged with the administration of the land laws of the colony and of the Crown forests, diamond and other mines and mineral deposits, geological explorations and irrigation and water supply, all formerly attached to the Department of Crown Lands and Public Works, and it has also taken over from the colonial secretary's division all matters dealt with by the former Department of Agriculture, including all matters in the hands of the Government connected with the agricultural and pastoral interests of the colony, notably wool growing; improvement in the breeds of stock, including horses; diseases and insect pests affecting animals and plants; viticulture, wine making, fruit culture, and tobacco culture. It administers the Scab and Animal Diseases Acts, the Fishery and Game Laws, and the funds voted by Parliament for the above services for agricultural societies, and for public parks and gardens. It publishes the *Agricultural Journal*, which is sent free to members of any agricultural society, and also pamphlets on a large number of subjects related to agriculture, which are sold at a nominal price.

Government Analytical Laboratory, Cape Town.

Governing board.—Colonial Secretary's Department.

Staff.—Charles F. Juritz, M. A., *Dir. and Senior Analyst;* J. Müller, B. A. (*Grahamstown*), J. Lewis, M. A., St. C. O. Sinclair, M. A.,

J. G. Rose, A. J. J. B. Simons, B. A., *Assts.;* three clerks; three laboratory helpers.

Origin.—The laboratory in Cape Town was established in 1889 and reorganized in 1891. The branch laboratory at Grahamstown was established in 1902.

Equipment.—Two laboratories, one at Cape Town and one at Grahamstown.

Income.—For 1903, $9,639 (fees for analyses, $6,807; clerical work, $952; fines from vendors of adulterated food stuffs, $1,880).

Lines of work.—Analyses of soils, fertilizers, sheep dips, minerals, etc., for the Department of Agriculture; of foods and drugs for the administrator of the Adulteration Act; of water for the railway department, health department, and municipal corporations; toxicological and chemico-legal investigations for the law department; oils for the railway stores department, and generally all analytical work required by the customs and other government offices.

Cape Government Herbarium, Cape Town.[a]

P. MacOwan, *Cur.*

School of Agriculture, Elsenburg.

Governing board.—Department of Education.

Staff.—William G. Mason, *Prin.*, assisted by other members of the staff.

Origin.—In 1900 a portion of the school farm was fenced and drained for an experiment station.

Equipment.—Certain portions of the school farm are set aside for field experiments.

Lines of work.—Investigations with manures on the various crops grown at the Cape; variety tests of forage and other crops; tests of newly introduced plants and experiments with fruits.

CEYLON.

Department of Royal Botanic Gardens, Peradeniya.[a]

Staff.—John C. Willis, *Dir. and Bot.;* J. B. Carruthers, *Asst. Dir. and Myc.;* E. Ernest Green, *Ent.;* M. K. Bamber, *Chem.;* R. H. Lock, *Sci. Asst.;* H. Wright, *in charge of Expt. Sta.;* H. F. McMillan, *Cur.*

Origin.—Founded in 1821; considerably extended in recent years; experiment station established in 1902.

Equipment.—New laboratory building containing four laboratories, director's office, and dark room; conservatory, fern house, and other buildings containing herbarium, library, and museum; botanic gar-

[a] See Royal Gardens, Kew, p. 161.

dens covering 150 acres and experiment station of 500 acres at Peradeniya, and branch botanic gardens at Anuradhapura (D. F. de Silva, *Con.*), Badulla (D. T. de Alwis, *Con.*), Hakgala (William Nock, *Cur.*), Henaratgoda (W. Perera, *Con.*), and Nuwara Eliya (D. Michael, *Con.*). There are also branch laboratories at Hakgala and Henaratgoda.

Income.—For 1903, $28,000.

Lines of work.—The introduction and cultivation of new economic plants, ornamental plants, fruits, and trees; experiments in methods of cultivation and preparation of products; investigations in vegetable pathology and economic entomology; explorations and study of local flora, and of general tropical botany, vegetable physiology, etc.; collection and preservation of herbarium specimens, and meteorological observations. The laboratories are open to scientific workers from other countries, for whom accommodation is reserved. The department publishes annually reports and numerous circulars for the instruction of the people of Ceylon.

CHILE.

Agronomic Station, Chemical Laboratory, and Veterinary Hospital of the Normal School of Agriculture (Quinta Normal de Agricultura), Santiago.

Governing board.—Committee of the Ministry of Industry and Public Works.

Station staff.—René F. Le Feuvre, *Dir. and Agr.;* Enrique Taulis, *Dir. of the Agron. Sta. and Chem.;* Julio Besnard, *Dir. of the Zoot. Lab.;* Horacio Concha, *Agr. Engin.;* assistants and helpers.

Origin.—The Quinta Normal de Agricultura comprises four sections or departments: (1) The college of agriculture, established in 1876, including the agronomic station, the laboratory of zootechnics and vaccine, and the veterinary hospital; (2) the institute of practical agriculture; (3) the department of parks, gardens, and aquarium; and (4) the department of administration and accounts. Only the first section is engaged in experimental work.

Equipment.—The equipment of the Quinta Normal inventories at $2,600,000; that of the college of agriculture at $123,200, the latter including a chemical laboratory, a laboratory of zootechnics and vaccine, and a veterinary hospital. In the experimental work use is also made of the experimental fields, orchards, vineyards, and other equipment of the Quinta Normal.

Income.—The receipts of the whole institution vary from $60,000 to $80,000 per annum. This money is turned into the Government treasury, and Congress makes annual appropriations for the support of the institution. The appropriation for 1901 was $180,747.25. From the total appropriation the governing board makes apportionments for the support of each department.

Lines of work.—Analysis of soils, fertilizers, and seeds; investigations in animal and plant physiology and pathology; and the improvement of methods of culture. The station manufactures vaccine, introduces and tests new plants, new farm machinery, and new breeds of live stock, and in every way possible strives to improve the condition of agriculture in Chile.

CUBA.

Central Experiment Station, Santiago de Las Vegas.

Governing board.—The station is under the general supervision of the Secretary of Public Works, who is also at the present time Acting Secretary of Agriculture.

Station staff.—F. S. Earle, *Dir.;* N. S. Mayo, *V.-Dir., Animal Husb.;* Francisco Cruz, *Agr.;* C. F. Austin, B. S., *Hort.;* E. W. Halstead, *Asst. Hort.;* Dr. Mel T. Cook, *Veg. Path.;* W. T. Horne, *Asst. Veg. Path.;* C. F. Baker, *Bot.;* Percy Wilson, *Asst. Bot.* Experts in animal industry, chemistry and soil physics are to be appointed.

Origin.—Established in 1904.

Equipment.—The station is located on a tract of 180 acres of land, containing a large stone building, which was at one time a Spanish barracks and more recently has been occupied by an industrial school for orphan boys which has now been moved to the city of Habana. The land is old and worn, but in many respects is typical.

Income.—For 1904 a government appropriation of $75,000.

Lines of work.—At the present time the station is in process of organization. Six departments have been provided for, as follows: (1) Agriculture; (2) animal industry, including veterinary science; (3) horticulture; (4) chemistry and soil physics; (5) botany; and (6) vegetable pathology, including entomology.

DENMARK.

Department of Agriculture, Copenhagen.

His Excellency Ole Hansen, *Minis. of Agr.*

H. C. O. Gram, *Chief of the Bureau of Agr.*

The Danish Department of Agriculture was organized in May, 1896, but government aid for agricultural education and research dates from a much earlier period. For many years the Royal Danish Agricultural Society has been a powerful agency for the advancement of agricultural research in Denmark. In April, 1881, it began making appropriations for the Seed Control Station at Copenhagen, and five years later the Plant Culture Station at Tystofte, with its system of branch stations, was established under the auspices of this society. In former years it was chiefly through the agency of this society that the Government aided various agricultural enterprises, and at the

present time the Department of Agriculture directs many of its efforts in aid of agriculture through the agency of this organization. Other societies also, chief among which is the Danish Heath Society, are the recipients of aid from the department. The Royal Veterinary and Agricultural College, with its research laboratories, and the Seed Control Station in Copenhagen are now under the direct control of the Department of Agriculture.

Moor Experiment Stations of the Danish Heath Society, Aarhus.

Governing board.—Under the direction of a committee of twenty.

Station staff.—Th. Claudi Westh, *Dir.;* A. Mentz, *Bot.;* seven agricultural assistants.

Origin.—The society was founded in 1866 and the moor experiment stations in 1889.

Income.—In 1900 the income of the society was $81,432.62 ($69,333.33 from the State), and that of the Division of Moors and Meadows, $21,415.47 ($8,133.33 from the State).

Lines of work.—Moor experiments on two large fields (865 acres and 124 acres); meadow experiments on one large field (247 acres); demonstration moor stations on 458 private fields; chemical, botanical, and agricultural investigations on the moor and meadow areas of the country; free instruction to farmers.

Experiment Station, Ascov.

F. Hansen, *Dir.*

(See Experiment Station, Tystofte, p. 92.)

Agricultural and Experimental Laboratory of the Royal Veterinary and Agricultural College, Copenhagen.

Governing board.—Under control of the Royal Veterinary and Agricultural College, which in turn is under the Department of Agriculture.

Station staff.—F. Friis, *Dir.;* Prof. V. S. Storch, *Chem.;* Prof. B. L. F. Bang and C. O. Jensen, *Chiefs of Bact. Labs.;* Dr. V. Henriques, *Chief of Physiol. Lab.;* eleven assistants and an accountant.

Origin.—Dairy investigations at the Royal Veterinary and Agricultural College were begun by Prof. N. J. Fjord in 1872, but the origin of the Agricultural Experimental Laboratory as a separate institution dates from 1883, at which time the Government expended $33,000 in the erection of a laboratory building and placed Professor Fjord in charge as director. After the death of Professor Fjord in 1891, F. Friis became director of the laboratory.

Equipment.—Main building, containing a chemical laboratory, several large offices and suites of rooms for the director and the chief of the chemical laboratory; a building for butter exhibitions, with

adjoining ice house; a building containing two bacteriological laboratories, a physiological (animal) laboratory, and a room for the cultivation of tubercle bacilli and the production of tuberculin.

Income.—The total budget of the laboratory for 1902, including the appropriation for butter exhibitions, was $37,530, all of which was appropriated by the State.

Lines of work.—The most important investigations of the laboratory have been those connected with the dairy industry, especially the comparative feeding experiments with milch cows, which were begun in 1887 by Professor Fjord and are still being carried on. These experiments have been conducted on such a large scale and with such care in every detail that the results are considered conclusive. The other work of the laboratory includes feeding experiments with pigs, investigations on tuberculosis in dairy animals and its eradication, the manufacture of tuberculin, and the study and testing of machinery and apparatus used in dairying. The laboratory also has charge of butter exhibitions, which entail an annual expenditure of about $10,700, and which have been instrumental in developing a large export trade in butter. Reports are published as often as results of sufficient importance are obtained.

Chemical Laboratory and Control Station, Copenhagen.

Station staff.—Prof. V. Stein, *Dir.*

Origin.—This is a private laboratory. Most of the work done is for the Royal Danish Agricultural Society.

Lines of work.—Dairy investigations; analysis of feeding stuffs, fertilizers, dairy products, soils, marls, root crops, etc. The number of samples analyzed each year is between 7,000 and 10,000, of which about two-thirds are dairy products.

Seed Control Station, Copenhagen.

Governing board.—Seed control commission of six members, appointed by the State.

Station staff.—K. Dorph-Petersen, *Dir.;* three assistants, eight helpers.

Origin.—Founded in 1871 by E. Möller-Holst, who maintained it until 1881, when the Royal Danish Agricultural Society made an annual appropriation of $268 and later $536 for its support. In 1883 the Government began making appropriations for the station, and in 1891 assumed full control and appointed O. Rostrup, director.

Equipment.—Laboratory, seed-testing apparatus, collection of seeds, reference library, and trial field.

Income.—Government subsidy of about $2,000 per annum and fees.

Lines of work.—Analysis and control of seeds. The number of seed samples analyzed since 1871 aggregates about 40,000.

Laboratory of Vegetable Physiology of the Royal Veterinary and Agricultural College, Copenhagen.

Station staff.—Prof. W. Johannsen, *Dir.*

During the last five or six years Professor Johannsen, plant physiologist of the Royal Veterinary and Agricultural College, has conducted important investigations at the college botanical laboratory. Among his studies are those concerning the relation of weight to nitrogen content of barley, variation and improvement of barley, ripening of seed, etc. Professor Johannsen succeeded recently in shortening the resting period of various plants by exposing the buds or bulbs for twenty-four hours to an atmosphere saturated with chloroform or ether vapors. This accomplishment is considered an important one, and the subject is being studied by other European investigators.

Carlsberg Physiological Laboratory, Copenhagen.

Prof. E. C. Hansen, *Dir.*

The lines of investigation pursued at this laboratory include physiological and morphological studies of alcoholic ferments, studies of variation in yeasts, biological investigations with mushrooms and other fungi, and study of the life history of numerous micro-organisms.

Experiment Station, Lyngby.

Governing board.—Committee of the Royal Danish Agricultural Society.

Station staff.—K. Hansen, *Dir.;* J. C. Larsen, *1st Asst.*

Origin.—Established in 1890 by the Society for the Improvement of Agriculture; transferred to the control of the State in 1893.

Equipment.—Plant house, laboratory for root analyses, and other buildings; experiment fields covering 25 acres, and implements for making culture experiments.

Income.—For 1902, $3,216 (State $2,680; other sources, $536).

Lines of work.—Comparative culture experiments with field crops; experiments in using different quantities of seed and in sowing at different times; improvement of cultivated plants; investigation of plant diseases; supervision of local fertilizer experiments and demonstration field. (See Experiment Station, Tystofte, below.)

Experiment Station, Tystofte.

Governing board.—Committee of the Royal Danish Agricultural Society.

Station staff.—N. P. Nielsen, *Dir.*

Origin.—The experiment station at Tystofte was established in 1886, and is the principal Danish station in plant culture. It has a farm of

54 acres and is maintained by the State. Branch stations engaged in similar work are located at Ascov, Lyngby, and Vester-Hassing, where soil conditions are very different than at Tystofte.

Income.—The four stations cost the Government $10,500 a year.

Lines of work.—Variety tests with cereals, legumes, root crops; rotation and fertilizer experiments; investigation of methods of culture, and hybridization.

Experiment Station, Vester-Hassing.

A. J. Hansen, *Dir.*

(See Experiment Station, Tystofte, p. 92.)

EGYPT.

Khedivial Agricultural Society, Cairo.

George P. Foaden, *Sec.*

This society was organized in 1898, under the patronage of the Khedive, for the promotion of agricultural investigations on seeds, plants, fertilizers, domestic animals, insects, and birds. It has established experimental farms at Ghiseh and Mit-el-Diba, and has conducted fertilizer experiments with cotton at these places and at many other places in cooperation with farmers. Results are published in the *Journal of the Khedivial Agricultural Society.*

FRANCE.

Ministry of Agriculture, Paris.

Jean Dupuy, *Minis. of Agr.;* L. Vassillière, *Dir. Dept. of Agr.;* Daubrée, *Dir. Dept. of For.;* Philippe, *Dir. Dept. of Agr. Hydraulics;* Hornez, *Dir. Dept. of Horse Breeding;* L. Grandeau, *Insp. Gen. of Agr. Stas.*

The French Ministry of Agriculture was created in 1881 and comprises four departments, each of which is subdivided into several bureaus. The ministry controls and directs the whole system of institutions for agricultural education and research, grants subsidies for their support, and publishes reports of their operations. The official publication of the ministry is the *Bulletin du Ministère de l'Agriculture*, in which appear all official laws, decrees, and reports of the ministry, besides agricultural statistics and numerous papers on agricultural subjects. There are also several journals, such as *Annales de la Science Agronomique* and *Annales Agronomiques*, which are published under the auspices of the ministry and contain reports of stations and laboratories and papers on agricultural subjects.

The agricultural stations and laboratories of France are under the general direction of an officer of the Ministry of Agriculture, the inspector-general of agricultural stations and laboratories. Prof. L.

Grandeau has held this position since its creation in 1882. The institutions under the direction of the inspector-general are of two general classes, (1) agricultural stations, which are engaged principally in research work; and (2) agricultural laboratories, which are engaged in analytical work for farmers, research work being only incidental, if done at all.

Experiment Station for Sericulture, Alais, Gard.

Governing board.—Ministry of Agriculture.

Station staff.—G. Mozziconacci, *Dir.*

Origin.—Established April 1, 1897, by the Ministry of Agriculture.

Equipment.—A micrographic laboratory, including library and collections; a small chemical laboratory with dark room; a room containing an experimental vat to prepare silk for reeling, and apparatus for breeding; three nurseries for silkworms; a room in which mulberry leaves are kept during the breeding of worms; a class room.

Income.—For 1902, $1,100.10 (Ministry of Agriculture, $868.50; department, $115.80; town of Alais, $115.80).

Lines of work.—Investigations in the breeding, rearing, and treatment of silkworms. Gratuitous instruction in the various features of silk production is given to all who apply.

Agricultural Station, Amiens, Somme.

Governing board.—Ministry of Agriculture.

Station staff.—Roger, *Dir.;* Roullier, *Lab. Asst.;* several assistants.

Origin.—Established in 1879 by the General Assembly of Somme.

Equipment.—The station is installed in a rented building, which contains an office, a laboratory, and a dark room. There is also a shed and an experimental field.

Income.—For 1903, $2,123.42 (Ministry of Agriculture, $386; town, $96.50; department, $1,640.92).

Lines of work.—Cultural and manurial experiments with field crops; irrigation investigations; variety tests; experiments with commercial fertilizers; the making of agricultural maps, and analyses of fertilizers, soils, feeding stuffs, and seeds.

Agricultural Station, Arras, Pas-de-Calais.

Governing board.—Department of Pas-de-Calais.

Station staff.—Vuaflart, *Dir.;* Delattre, *First Asst. Chem.;* Lefort, *Second Asst. Chem.;* Echard, *Lab. Asst.*

Origin.—Founded in 1869, under the direction of A. Pagnoul and with the cooperation of the town, the department, and the Ministry of Agriculture. Until 1883 it was connected with the college at Arras; then it was made a departmental establishment, installed in buildings

erected especially for its use, and given the name of the Agricultural Station of Pas-de-Calais.

Equipment.—Laboratory building, including museum; two analytical laboratories; director's private laboratory; office, storerooms, dark room, conservatory, and other rooms, with complete apparatus for meteorological observations.

Income.—For 1902, $2,856.40 (Ministry of Agriculture, $482.50; department, $2,373.90).

Lines of work.—Analyses for the public; meteorological observations; research work, including experiments with field crops with and without manure, soil investigations, experiments with commercial fertilizers, especially nitrates and phosphates.

Agricultural Station, Auxerre, Yonne.

Governing board.—Ministry of Agriculture.

Station staff.—Eug. Rousseaux, *Dir.;* C. J. B. Brioux, *Chem.*

Origin.—Established in 1882 by the Department of Yonne.

Equipment.—Four laboratory rooms.

Income.—For 1902, $1,833.50 (Ministry of Agriculture, $772; department, $772; fees, $289.50).

Lines of work.—Analysis of waters, soils, and fertilizers.

Agricultural Station, Banyuls, Pyrénées-Orientales.

Governing board.—Ministry of Agriculture and the Paris Faculty of Sciences.

Station staff.—Delaye, *Dir.;* a mechanician, a doorkeeper, a boatman, 4 sailors, and a cabin boy.

Origin.—Established in 1881, through the cooperation of Department of Pyrénées-Orientales and the town of Banyuls.

Equipment.—Fifty rooms in a building belonging to the State, a steamboat, 3 sailboats, aquariums, and a large experimental fish pond.

Income.—For 1902, $328.10 (Ministry of Agriculture, $231.60; the town, $96.50). The Ministry of Public Instruction pays salaries and laboratory expenses.

Lines of work.—Research work in agriculture.

Enological Station of Bourgogne, Beaune, Côte-d'Or.

Governing board.—Ministry of Agriculture.

Station staff.—L. Mathieu, *Dir.;* Ch. Billon and R. de Saint-Andéol, *Lab. Assts.;* F. E. Carimentran, *Sec.;* P. Fèvre, *Form.* A committee of 40 wine tasters have control of the practical experiments executed by the station.

Origin.—Established August 10, 1900, by the Ministry of Agriculture. During the year 1901, $28,950 was raised by the town of Beaune,

$8,685 by the Department of Côte d'Or, and $5,790 by private subscription for the erection of buildings and the purchase of equipment.

Equipment.—Three laboratory rooms, one provided with special apparatus for making analyses of wines and one with microscopes, incubators, and other bacteriological apparatus; a cooper shop, and two experiment cellars with 104 casks and 654 bottles.

Income.—Budget from the Ministry of Agriculture for 1902, $1,930.

Lines of work.—Scientific investigations in the different processes of wine making. The station has made important experiments in sterilizing wines by heating and filtering.

Agricultural Station of Oise, Beauvais, Oise.

Governing board.—The station is connected with the Agricultural Institute of Beauvais and is under the immediate direction of the director of the institute and the general supervision of a station council, consisting of the director, several members of the institute staff, and a delegate from each agricultural society of Oise.

Station staff.—Frere Paulin, *Dir.*, *Agr. Met.;* M. Leluy, Frere Natal, and M. Milon, *Chems.* A number of other instructors of the institute assist in the station work.

Origin.—Founded in 1873 at Beauvais with the cooperation of the five societies of agriculture of the department, the Society of Agriculture of France, the Consul-General of the department, and the Ministry of Agriculture.

Equipment.—Laboratory and apparatus of the institute.

Lines of work.—Analyses for farmers and manufacturers, including analyses of soils, commercial fertilizers, manures, feeding stuffs, farm crops, milk, waters, products of the vine, minerals, seeds, and grasses.

Agricultural Station of Franche-Comté, Besançon, Doubs.

Station staff.—Parmentier, *Dir.;* Bruchon, *Chief Div. of Bact. and Hygiene.*

Established by ministerial decree of July 18, 1901, at the University of Besançon.

Agricultural Laboratory, Béthune, Pas-de-Calais.

Governing board.—Ministry of Agriculture and the Agricultural Society of Béthune.

Station staff.—Ponnelle, *Dir.;* one assistant.

Origin.—Founded in 1877, and until 1889 connected with the chemical laboratory of the college at Béthune; now entirely independent.

Equipment.—A laboratory provided and kept in repair by the town, and an agricultural library open to farmers at certain hours.

Income.—For 1902, $434.25 (Ministry of Agriculture, $193; Agricultural Society of Béthune, $9.65; fees, $231.60).

Lines of work.—Analysis of agricultural products, oil cakes, fertilizers, beets, waters, wines, and beer; study of the soils and of the principal crops of the department, such as grain, beets, tobacco, and flax.

Agricultural Station at Blois, Loir-et-Cher.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—Vézin, *Dir.;* Fallot, *V.-Dir. and Chem.;* Barrau, *Lab. Asst.;* Jenlin, *Helper.*

Origin.—Established in August, 1887, by the General Assembly of Loir-et-Cher.

Equipment.—A departmental building containing seven rooms, and an experiment field containing about 1¼ acres.

Income.—For 1900, $2,856.40 (Ministry of Agriculture, $868.50; department, $1,312.40; fees, $675.50).

Lines of work.—Field experiments with the principal field crops of the department, supplemented by laboratory studies of the same; analysis of soils, fertilizers, waters, flours, chocolates, wines, etc., and the making of agricultural maps.

Agricultural and Enological Station, Bordeaux, Gironde.

Governing board.—Ministry of Agriculture and the Bordeaux Faculty of Sciences.

Station staff.—U. Gayon, *Dir.;* Laborde, *V.-Dir.;* a laboratory assistant and two helpers.

Origin.—Founded September 21, 1880, by the Ministry of Agriculture.

Equipment.—Agricultural chemical laboratory provided by the Department of Gironde.

Income.—For 1902, $2,509 (Ministry of Agriculture, $1,621.20; Ministry of Public Instruction, $366.70; department, $250.90; fees, $270.20).

Lines of work.—Laboratory research work, including analytical and bacteriological investigation of the principal agricultural products of the department, such as sugar, wine, and grain; analytical work for the people of the department. The analyses are gratuitous for agricultural societies, committees, and officers, and for engineers and officers elected by the department.

Fish Culture Station, Boulogne-sur-Mer, Pas-de-Calais.

Governing board.—Ministry of Agriculture.

Station staff.—Cligny, *Dir.;* a vice-director, a doorkeeper, three fishermen.

Origin.—Established July 30, 1883, on a part of the public domain, by the Ministry of Agriculture cooperating with the town of Boulogne-sur-Mer and the Chamber of Commerce.

Equipment.—Aquarium room, experimental laboratory, sheds, fishing apparatus, and museums. A boat belonging to the Government is at the disposal of the station.

Income.—For 1902, $2,219.50 from the Ministry of Agriculture.

Lines of work.—Investigations in breeding and protecting fish in the rivers and seaboard waters of northern France; experiments in stocking the waters with salmon and other fish; studies of the natural history of the most important fishes of the country, of methods of preserving nets, of frozen herring for use as bait, and of other problems that appear to be important in producing and handling fish.

Agricultural Laboratory, Boulogne-sur-Mer, Pas-de-Calais.

Governing board.—Department of Pas-de-Calais.

Station staff.—Bruno, *Dir.;* Sergent, *Asst. Chem.;* Fourrey, *Lab. Asst.*

Origin.—Established January 5, 1888, in connection with the Fish Culture Station at this place; independent since 1895.

Equipment.—Two laboratories in buildings furnished by the Department of Pas-de-Calais for the Fish Culture Station.

Income.—For 1902, $1,930 (Ministry of Agriculture, $579; department, $579; fees, $772).

Lines of work.—Analysis of food products, soils, fertilizers, waters, and butter.

Agricultural Laboratory, Bourg-en-Bresse, Ain.

L. J. Grandvoinnet, *Dir.*

Agricultural Station, Caen, Calvados.

Governing board.—Ministry of Agriculture and the Caen Faculty of Sciences.

Station staff.—M. Louïse, *Dir.;* Paisnel, *Lab. Asst.*

Origin.—Established by Isidore Pierre.

Equipment.—Two laboratories.

Income.—For 1902, $1,177.30 (Ministry of Agriculture, $530.75; Ministry of Public Instruction, $376.35; Department of Calvados, $154.40; Department of Manche, $115.80).

Lines of work.—Analysis of soils, fertilizers, waters, feeding stuffs, and dairy products.

Pomological Station, Caen, Calvados.

Warcollier, *Dir.*

Agricultural Experiment Station, Capelle, Nord.

Governing board.—The station is under the control of the proprietors, G. and F. Desprez.

Station staff.—Paul Jenart, *Supt.;* two assistant chemists; two assistants in vegetable pathology; four general assistants.

Origin.—This station was established in 1854 in connection with the seed farm of Florimond Desprez and Viollette, and was the first station in Europe devoted to selection experiments with field crops. Beginning in 1888 the station received for a number of years an annual subsidy of nearly $600 from the State, but this has been discontinued.

Income.—Supported by the proprietors.

Lines of work.—Seed testing; cultural, fertilizer, and variety tests with wheat, oats, sugar beets, potatoes, and other field crops; study of plant diseases; instruction to farmers along lines covered by the station investigations and in feeding farm animals.

Agricultural Laboratory, Châlons, Marne.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—Chappaz, *Dir.;* Haura, *Chem.;* Rounet, *Asst. Chem.*

Origin.—Established August 25, 1887, by the General Assembly of Marne.

Equipment.—A departmental building and an experimental field of about 2½ acres.

Income.—For 1902, $2,702 (Ministry of Agriculture, $289.50; department, $1,544; fees, $868.50).

Lines of work.—Analysis of soils, fertilizers, waters, feeding stuffs, and beets.

Agricultural Station, Chartres, Eure-et-Loir.

Governing board.—Ministry of Agriculture.

Station staff.—C. V. Garola, *Dir.;* Braun, *Lab. Asst.;* Delafoy, *Clerk.*

Origin.—Established in 1882 through the cooperation of the meteorological commission and the Department of Eure-et-Loir.

Equipment.—Two laboratories in a building belonging to the town, a vegetation house, and an experiment field.

Income.—For 1900, $2,933.60 (Ministry of Agriculture, $772; department, $579; fees, $1,582.60).

Lines of work.—Analysis of soils, fertilizers, etc., for farmers; experiments with field crops to test various fertilizers and methods of culture.

Agricultural Station, Chateauroux, Indre.

Governing board.—Ministry of Agriculture.

Station staff.—Alla, *Dir.;* Baloux, *Lab. Asst.*

Origin.—Established in 1874 by Guinon.

Equipment.—Five rooms in a rented building, 15 vegetation cases, and an experimental vineyard.

Income.—For 1902, $2,306.35 (Ministry of Agriculture, $907.10; department, $463.20; agricultural society, $434.25; fees, $501.80).

Lines of work.—Analysis of soils, lime, marls, fertilizers, water, and feeding stuffs.

Agricultural Station, Cluny, Sâone-et-Loire.

Governing board.—Ministry of Agriculture.

Station staff.—Paturel, *Dir.;* a laboratory assistant.

Origin.—Established January 25, 1887, by Bernard, in cooperation with the department and the town, as a departmental laboratory.

Equipment.—Laboratory building containing two laboratories and an office.

Income.—For 1902, $1,119.40 (Ministry of Agriculture, $579; department, $540.40).

Lines of work.—Analysis of soils, fertilizers, waters, wines, musts, feeding stuffs, and miscellaneous articles.

Viticultural Station, Cognac, Charente.

Governing board.—Ministry of Agriculture.

Station staff.—J. M. Guillon, *Dir.;* Gouirand, *V.-Dir.;* Brunaud, *Lab. Asst.*

Origin.—Established in 1874 under the auspices of the viticultural committee of the district of Cognac, with A. Cornu as director. Brought under government control by ministerial decree of November 7, 1892.

Equipment.—Laboratory building, greenhouse and trial garden at Cognac, and demonstration fields in different parts of the district of Cognac. The laboratory building contains the director's office, chemical, micrographic, and bacteriological laboratories, and collections of botanical, geological, and zoological specimens.

Income.—The Ministry of Agriculture provides funds for salaries, amounting in 1902 to $2,605.50, and the viticultural committee of the district of Cognac subscribes about $2,895 per annum for the support of the laboratory and field work.

Lines of work.—Investigation of mildew, black rot, and other diseases of the vine, and of means for combating them; analysis of soils, fertilizers, insecticides, and wines; experiments in demonstration fields to test methods of culture and varieties of grapes, especially those that will resist attacks of phylloxera.

Agricultural Laboratory, Commercy, Meuse.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—Prudhomme, *Dir.*

Origin.—Established in 1877 by the Commercy Agricultural Society.

Equipment.—Two rooms in a building furnished by the town.

Income.—For 1902, $295.29 (Ministry of Agriculture, $104.22; department, $86.85; Commercy Agricultural Society, $104.22).

Lines of work.—Analysis of soils and fertilizers.

Agricultural Station, Dijon, Côte-d'Or.

Governing board.—Ministry of Agriculture and the Dijon Faculty of Sciences.

Station staff.—Recoura, *Dir.;* M. Billier and Chaussin, *Lab. Assts.*

Origin.—Founded in 1884 upon the initiative of Duval, governor of Côte-d'Or, and Chapins, rector of the Academy of Dijon.

Equipment.—Three laboratories connected with the academy.

Income.—For 1900, $1,447.50 (Ministry of Agriculture, $579; Ministry of Public Instruction, $193; department, $482.50; fees, $193).

Lines of work.—Analysis of fertilizers and agricultural products, variety tests and other field experiments to determine the best crops and methods of culture for the department.

Marine Zoological Station, Endoume, Bouches-du-Rhône.

Governing board.—Ministry of Agriculture and the Marseille Faculty of Sciences.

Station staff.— ——— ———, *Dir.;* Gourret, *V.-Dir.;* a fisherman; a mechanician.

Origin.—Established in 1887, at Endoume Point, on the site of the old battery of Lions, at the expense of the city of Marseille, with contributions from the Ministry of Public Instruction and the Department of Bouches-du-Rhône.

Equipment.—Large study room with aquarium, physiological laboratory, laboratory for biological chemistry, three research laboratories, library, large underground reservoir, and complete apparatus for collecting, maintaining, and studying the marine fauna.

Income.—For 1902, $2,026.50 (Ministry of Agriculture, $386; Marseille Faculty of Sciences, $965; department, $289.50; city of Marseille, $386).

Lines of work.—Instruction in zoology; scientific research; and work in applied zoology, such as investigation of the food of edible fish and of the enemies of sardines, mackerel, and other fish of commercial importance.

Agricultural Laboratory, Épinal, Vosges.

Governing board.—Ministry of Agriculture and the General Assembly of Vosges.

Station staff.—Jolly, *Dir.*

Origin.—Established October 1, 1888, at Remiremont by the General Assembly of Vosges; transferred to Épinal October 1, 1895.

Equipment.—Five rooms in a building of the Industrial School of Vosges, belonging to the town.

Income.—For 1902, $675.50 (Ministry of Agriculture, $193; department, $482.50).

Lines of work.—Analysis of soils, fertilizers, waters, oil cakes, foods, and agricultural products.

Agricultural Laboratory, Foix, Ariège.

Governing board.—Ministry of Agriculture.

Station staff.—Soula, *Dir.*

Origin.—Established in 1884 by the Department of Ariège.

Equipment.—A room in the Normal Institute at Foix, and an experiment field of about 7½ acres.

Income.—For 1902, $115.80 (Ministry of Agriculture, $57.90; department, $57.90).

Lines of work.—Analysis of soils, fertilizers, wines, and lime.

Laboratory of Vegetable Physiology, Fontainebleau, Seine-et-Marne.

Governing board.—Ministry of Agriculture and the Paris Faculty of Sciences.

Station staff.—Gaston Bonnier, *Dir.;* Dufour, *Adjunct Dir.;* two laboratory assistants; a foreman; two gardeners.

Origin.—Established in 1890.

Equipment.—A part of the Government domain, including fields and a park of 8½ acres, in which are located a laboratory building containing 18 rooms and 6 other separate laboratories, and greenhouses.

Income.—For 1902, $3,512.60 (Ministry of Agriculture, $386; Ministry of Public Instruction, $2,952.90; department, $77.20; town, $96.50).

Lines of work.—Agricultural experiments, investigations in plant physiology, and apiculture.

Agricultural Station, Grignon, Seine-et-Oise.

Governing board.—Ministry of Agriculture—committee on agriculture, L. Vassillière and Dabat; the faculty of the National School of Agriculture.

Station staff.— ——— ———, *Dir.;* Dupont, *Chem.;* Berthault, *Agr.;* Bretigniere, *Asst. Agr.*

Origin.—Founded in 1875 by the Ministry of Agriculture.

Equipment.—Laboratories of the college at Grignon, with which the station is connected; equipment for pot culture; lysimeter for studying drainage and irrigation waters, and experiment field.

Income.—For 1902, $1,544 from the Ministry of Agriculture.

Lines of work.—Investigation of fertilizers, soils, and field crops for the purpose of studying plant nutrition. Among the problems investigated may be mentioned the following: Exhaustion of arable land by continuous culture without manure; losses and gains of nitrogen in the soil; loss of nitrogen through drainage water; humic matter as a necessary food for certain plants; autumn catch crops as conservators of nitrogen; influence of cultivation and aeration of the soil on the activity of nitric ferments; influence of fall plowing; the conservation of soil moisture; effects of electric lights on plant growth; effects of summer fallowing; irrigation as affecting the necessary outlay for nitrogenous fertilizers. Results of the investigations are published in *Annales Agronomiques.*

Station of Agricultural Climatology, Juvisy, Seine-et-Oise.

Governing board.—Ministry of Agriculture and the officers of the Observatory of Juvisy.

Station staff.—Camille Flammarion, *Dir.;* Loisel, *Lab. Asst.*

Origin.—Established at the Observatory of Juvisy in 1894 by Camille Flammarion.

Equipment.—Work rooms; three hothouses, with blue, red, and green glass, respectively; one ordinary hothouse; meteorological and physical apparatus; an experimental field of 11½ acres.

Income.—For 1902, $1,235.20, from the Ministry of Agriculture.

Lines of work.—Physical and meteorological researches, principally on solar rays and their action upon the phenomena of plant growth. Among the specific problems investigated are the following: The effect of solar rays on the development of plants; effect of different colored light upon the development, color, and transpiration of plants; the sun and its influence upon the temperature of the air and soil; the internal temperature of trees; action of electricity upon plant growth; rainfall and subterranean waters.

Agricultural Station and Bacteriological Laboratory, Laon, Aisne.

Governing board.—Mazuriez, *Pres.;* V. Viéville, *V.-Pres.;* Gentilliez, *Sec.;* Pelletier, Carré, Ermant, Dupuy, Letellier, Boulongne.

Station staff.—L. Gaillot, *Dir. and Chem.;* G. Brouet, L. Bourdon, and H. Rousset, *Assts. Chem.;* L. Lavoine, *Agr. Engin. and Asst. in Bact.;* M. Lefebvre, *Sec.;* G. Lagrange, *Porter.*

Origin.—Agricultural station opened October 1, 1889; bacteriological laboratory opened in 1895.

Equipment.—Large general laboratory, small laboratory, room for balances and instruments of precision, dark room, director's office, cellars, granaries, meteorological apparatus, bacteriological laboratory; a garden, at the rear of which is a laboratory of vegetable pathology

and physiology, and experiment fields at a distance of about one-half mile from the station.

Income.—For 1902, $6,369 (Ministry of Agriculture, $579; local contributions, $3,088; analyses, $2,702).

Lines of work.—Research work with field crops and fertilizers in both laboratory and field; analysis of soils, fertilizers, water, and agricultural products; the testing of seeds and grains; meteorological observations applied to agriculture; investigation of bacterial diseases of man and beast, and of plant physiology and pathology. The director is consulting chemist, plant physiologist, and bacteriologist of the department, inspector of fertilizers and butter, and has charge of agricultural-geological maps made for the department.

Agricultural Laboratory, Laval, Mayenne.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—H. Leizour, *Dir.;* Masseron, *Lab. Asst.*

Origin.—Established December 29, 1880, by the General Assembly of Mayenne.

Equipment.—A rented building containing five rooms.

Income.—For 1902, $1,563.30 (Ministry of Agriculture, $193; department, $1,254.50; fees, $115.80).

Lines of work.—Almost exclusively the gratuitous analysis and control of fertilizers. A few analyses of agricultural products are made, and for these fees are exacted.

Zoological Laboratory, Les Sables d'Olonne, Vendée.

Governing board.—The laboratory is a private institution under full control of the director, but is under the patronage of the ministries of agriculture and the navy and of the municipality of Les Sables d'Olonne.

Station staff.—Amédée Odin, *Dir.*

Origin.—Established in 1892 by the director at his own expense.

Equipment.—Two well-equipped laboratories; aquarium for physiological experiments with fish, oysters, crustaceans, etc.; boats and other fishing apparatus.

Income.—For 1902, $57.90, from the General Assembly of the Department of Vendée. The director furnishes other necessary funds.

Lines of work.—Investigations and experiments with salt and fresh water fishes and other marine animals; analysis of marine fertilizers, imported goods, and preserved and canned fish, etc.

Agricultural Station, Lézardeau, near Quimperlé, Finistère.

Governing board.—Ministry of Agriculture and the Lézardeau School of Practical Agriculture.

Station staff.—J. Crochetelle, *Dir.*

Origin.—Established January 1, 1873, in connection with the departmental chemical laboratory and the College of Irrigation and Drainage at Lézardeau.

Equipment.—The station makes use of the college laboratories and has an experiment field.

Income.—For 1902, $337.75 (Ministry of Agriculture, $289.50; department, $48.25).

Lines of work.—Analyses, partly gratuitous, of fertilizers, soils, waters, feeding stuffs, apples, seeds, and agricultural products; experiments with fertilizers and with the principal agricultural products of the department.

Agricultural Station, Lille, Nord.

Governing board.—Ministry of Agriculture.

Station staff.—A. Dubernard, *Dir.;* Paulhiac, *Asst.;* two helpers.

Origin.—Established in 1869 by Corenwinder.

Equipment.—Laboratory and experiment field.

Income.—For 1902, $1,949.30 (Ministry of Agriculture, $386; department, $579; fees, $984.30).

Lines of work.—Analysis of agricultural products, soils, waters, feeding stuffs, seeds, and fertilizers; field experiments with fertilizers and the principal field crops of the department.

Agricultural Station, Lyon, Rhône.

Governing board.—Ministry of Agriculture and the Lyon Faculty of Sciences.

Station staff.—L. Vignon, *Dir.;* Couturier, *V.-Dir.;* Barrillot and Riche, *Form.;* a field foreman.

Origin.—Established in 1880 by Raulin, aided by the Ministry of Agriculture.

Equipment.—Laboratory facilities in the Chemical Institute and an experimental field of about 7½ acres at Pierre Bénite.

Income.—For 1902, $1,891.40 (Ministry of Agriculture, $772; department, $772; agricultural society, $57.90; fees, $289.50).

Lines of work.—Analysis of soils and fertilizers and the making of agricultural maps.

Dairy Station, Mamirolle, Doubs.

Station staff.—Houdet, *Dir.*

Lines of work.—Dairy investigations, cheese making, and feeding experiments.

Sericultural Station, Manosque, Basses-Alpes.

Governing board.—Ministry of Agriculture and the special professor of agriculture at Manosque.

Station staff.—Brandi, *Dir.*

Origin.—Established August 6, 1892, by the Ministry of Agriculture.

Equipment.—Two laboratory rooms.

Income.—For 1902, $289.50, from the Ministry of Agriculture.

Lines of work.—Research work in silk husbandry.

Agricultural Station, Marseille, Bouches-du-Rhône.

Governing board.—Ministry of Agriculture.

Staff.—Gassend, *Dir.;* two laboratory assistants.

Origin.—Established in 1888 by Gassend at his own expense.

Equipment.—Six rooms and an experimental field near Aix.

Income.—For 1902, $2,316 (Ministry of Agriculture, $579; fees, $1,737).

Lines of work.—Analysis of soils, fertilizers, water, feeding stuffs, grains, sugar, explosives, and food products.

Laboratory for Technical Tests, Marseille, Bouches-du-Rhône.

Governing board.—The Ministry of Agriculture and the Ministry of Foreign Affairs.

Station staff.—E. Milliau, *Dir.;* Lefeuvre, *Form.;* four laboratory assistants.

Origin.—Established May 26, 1891, by the Ministry of Agriculture.

Equipment.—Eight laboratory rooms.

Income.—For 1902, $8,974.50 (Ministry of Agriculture, $579; Ministry of Foreign Affairs, $289.50; fees, $8,106).

Lines of work.—Analysis and control of fertilizers, oil cakes, oils, butter, and other articles of commerce.

Agricultural Station, Melun, Seine-et-Marne.

Governing board.—Ministry of Agriculture.

Station staff.—A. Vivier, *Dir.;* Lapchin, *Lab. Asst.*

Origin.—Organized and opened in 1887 by the General Assembly of Seine-et-Marne.

Equipment.—Eight rooms in a departmental building and a small experimental field.

Income.—For 1902, $2,798.50 (Ministry of Agriculture, $579; department, $1,447.50; fees, $772).

Lines of work.—Analysis and control of fertilizers, analysis of soils, beets, milk, and water; laboratory research work, especially with wines; field experiments with various manures upon the principal field crops of the department, important among which is the sugar beet. Research work is limited on account of the analytical work required of the station staff.

Station of Vegetable Physiology, Meudon, Seine-et-Oise.

Governing board.—Ministry of Public Instruction, Ministry of Agriculture, and the College of France.

Station staff.—Berthelot, *Dir.;* Gaudechon, *V.-Dir.;* one assistant; gardener; laboratory assistant.

Origin.—Established in 1883 on the domain of the ancient castle of Meudon.

Equipment.—Research laboratory containing a well-equipped analytical room with adjoining balance room, room for optical and electrical instruments, dark room containing a saccharimeter and polariscope, library and reading room, storerooms, quarters for keeper, etc. There is also a large laboratory for students. The grounds surrounding the laboratories are used for the cultivation of plants for experiments.

Income.—For 1902, $1,737 ($772 from the Ministry of Public Instruction and $965 from the Ministry of Agriculture).

Lines of work.—Investigations in the fixation of free nitrogen and of carbon, the formation of acids, sugars, and oils in plants; the rôle of mineral elements in the soil, the production of heat in plants and animals, the effect of atmospheric electricity on living organisms, and other problems in the province of vegetable physiology.

Enological Station, Montpellier, Hérault.

Governing board.—Ministry of Agriculture.

Station staff.—L. Roos, *Dir.;* F. Chabert, *Asst.*

Origin.—Established by the Ministry of Agriculture July 1, 1895.

Equipment.—Enological laboratory in one of the large school laboratory buildings, enological collection, wine cellars that can be regulated to any desired temperature, the college vineyard of 17 acres containing many varieties of grapes.

Income.—For 1902, $2,489.70 (Ministry of Agriculture, $1,872.10; department, $289.50; city, $115.80; and an agricultural society, $212.30).

Lines of work.—Study of problems in fermentation and the influence of temperature upon the same, and general research work in grape and wine production.

Sericultural Station, Montpellier, Hérault.

Governing board.—Ministry of Agriculture.

Station staff.—Francis Lambert, *Dir.*

Origin.—Founded in 1874 in connection with the School of Sericulture at Montpellier; annexed in 1880 to the National School of Agriculture at Montpellier.

Equipment.—A frame building containing three rooms for rearing silkworms, a place for mulberry leaves, a small laboratory, greenhouse

for mulberry trees, and a room containing a large collection of cocoons and silk moths, specimens of raw and carded silk, microscopes, and other instruments found in an entomological laboratory; a small silkworm nursery separated from the main building.

Income.—For 1901, $250.90 from the Ministry of Agriculture. This does not include salaries.

Lines of work.—Experiments in rearing and caring for silkworms of different varieties, in combating diseases and pests that attack them, with different varieties of mulberry, and with other phases of silk production.

Agricultural Station, Montpellier, Hérault.

Governing board.—Ministry of Agriculture.

Station staff.—H. Lagatu, *Dir.*

Equipment.—Agricultural laboratory and other laboratories of the National School of Agriculture at Montpellier; fields belonging to the school; a field of about 65 acres, situated on a lower level than the school, which is used for sewage experiments.

Income.—For 1900, $1,544 from the Ministry of Agriculture.

Lines of work.—Cultural and manurial experiments with field crops, rotation experiments, and irrigation experiments with sewage.

Viticultural Laboratory, Montpellier, Hérault.

Staff.—L. Ravaz, *Dir.*

Equipment.—Connected with the National School of Agriculture at Montpellier. The laboratory is well equipped for the study of the vine and its diseases and pests. It makes use of the college vineyard of 17 acres, containing many varieties of grapes, and has viticultural collections.

Lines of work.—Experiments with different varieties of grapes, and investigations of diseases and insect pests of the vine, especially phylloxera.

Agricultural Station, Nancy, Meurthe-et-Moselle.

Governing board.—Ministry of Agriculture.

Station staff.—E. Colomb-Pradel, *Dir.;* Pellier, *Form.;* Poupard, *Chem.;* E. Gain, *Agr. Bot.;* Dr. E. Macé, *Agr. Bact.;* A. Bourgeois, M. Alard, E. Cassez, *Agr. and Vit.;* L. Thiry, *Agr. Engin. and Rural Econ.;* L. Cuénot, *Agr. Ent., Zool., and Pisciculture;* R. Blondel, *Agr. Legislation;* E. Henry, *For. and Geol.;* P. Dieudonné, *Vet. and Zool.*

Origin.—In 1868 L. Grandeau founded at Nancy the Agricultural Station of the East. In 1890 this station was removed to Paris and in its place was established the Agricultural Station of Nancy, January 1, 1891.

Equipment.—Director's office and library and chemical laboratory; also experiment fields at St. Marx, Jarville, Toul, and Richebourg. The station has the cooperation of several departments of the University of Nancy and of the National School of Forestry, and in this way has the use of a number of special laboratories. Several members of the station staff are connected with other institutions and give but little time to station work.

Income.—For 1902, $2,827.45 (Ministry of Agriculture, $738.23; department, $738.22; fees, $1,061.50, and from the Ministry of Agriculture for field experiments, $289.50).

Lines of work.—Laboratory and research work in agricultural chemistry; analysis of fertilizers, soils, waters, feeding stuffs, seeds, and farm products for fees; investigations by the cooperating members of the staff in bacteriology, viticulture, entomology, veterinary science, etc. Recently the station has begun the publication of popular articles on agricultural topics, several of which are bound together in bulletin form.

Agricultural Station of the Pasteur Institute, Nantes, Loire-Inférieure.

Governing board.—Ministry of Agriculture and the Pasteur Institute.

Station staff.—A. Andouard, *Dir.;* P. Andouard, *V.-Dir.;* Gendre, *Sec.;* A. Laidet, *Asst.;* three helpers.

Origin.—In 1864 A. Bobierre opened at Nantes a departmental chemical laboratory; August 28, 1884, it was reorganized by Andouard, with the aid of the department, and became an agricultural experiment station.

Equipment.—A departmental building containing ten rooms for analytical and research work, and experiment fields containing about 5½ acres.

Income.—For 1902, $1,254.50 (Ministry of Agriculture, $386; department, $386; fees, $482.50).

Lines of work.—Analysis of soils, fertilizers, waters, feeding stuffs, oils, soaps, and agricultural products, cultural and manurial experiments with field crops, variety tests, bacteriological investigations, and other investigations with the agricultural products of the department.

Enological Station, Narbonne, Aude.

Governing board.—Ministry of Agriculture.

Station staff.—L. Semichon, *Dir.;* Astrue, *Lab. Asst.*

Origin.—Established January 10, 1895, by the Ministry of Agriculture, the expense of installation being borne jointly by the State and the city of Narbonne.

Equipment.—Laboratories and demonstration vineyards.

Income.—For 1902, $2,296.70 (Ministry of Agriculture, $1,717.70; department and town, $579).

Lines of work.—The research work includes the investigation of processes of wine manufacture; the study of the bacteriology of fermentation and of the diseases of the vine, such as oïdium, phylloxera, mildew, black rot, etc.; a general investigation of the vine products of southern France. The station also conducts public institutes among the grape growers, makes gratuitous analyses, and conducts a number of demonstration experiments intended as object lessons to promote the use of modern methods of culture and the introduction of improved varieties of vines.

Agricultural Laboratory, Nevers, Nièvre.

Governing board.—Ministry of Agriculture and departmental professor of agriculture.

Station staff.—Mancheron, *Dir.;* Lafontaine, *Lab. Asst.*

Origin.—Established October 1, 1882, through the cooperation of the Ministry of Agriculture, the Department of Nièvre, the town, and the citizens of the department.

Equipment.—Two laboratory rooms and an office.

Income.—For 1902, $1,061.50 (Ministry of Agriculture, $96.50; department, $965).

Lines of work.—Analysis of soils, fertilizers, beets, and water.

Departmental Agricultural Laboratory, Nimes, Gard.

Governing board.—Ministry of Agriculture and departmental professor of agriculture.

Station staff.—B. Chauzit, *Dir.;* Meyssel and Hugues, *Lab. Assts.;* Abel and Martin, *Helpers.*

Origin.—Established June 1, 1885, by the General Assembly of Gard with the cooperation of the Government, the town of Nimes, the Agricultural Society of Gard, and the agricultural committees of Alais, Uzès, and Vigan.

Equipment.—Laboratory facilities in a rented building, and an experimental field of about 6 acres at a short distance from Nimes.

Income.—For 1902, $1,003.60 (Ministry of Agriculture, $231.60; department, $289.50; fees, $482.50).

Lines of work.—Analysis of fertilizers, soils, foods, feeding stuffs, waters, wines, copper sulphate, and other agricultural products, and the making of agricultural maps.

Enological Station, Quai de la Fontaine, Nimes, Gard.

Governing board.—Ministry of Agriculture.

Station staff.—G. Barba, *Dir.;* E. Hugues, *Lab. Asst.*

Origin.—Established in 1895 by the Ministry of Agriculture aided by the department.

Equipment.—Laboratory facilities in a rented building.

Income.—For 1902, $1,293.10 from the Ministry of Agriculture.

Lines of work.—Research work in the production of wine, and the analysis of wines, musts, etc.

Colonial Garden, Nogent-sur-Marne.

Governing board.—An administrative council composed of seven members, of which E. Tisserand is president.

Station staff.—J. Dybowski, *Dir. and Insp. Gen. of Colon. Agr.;* Stanislas Pernot, *Sec. to the Dir.;* Paul Amman, *Chief Chem.;* Marcel Dubard, *Chief Bot.;* Chalot, *Dir. of Trial Garden and Chief of Cultural Investigations.*

Origin.—Established in 1899 by the Ministry of Colonies to direct the work of experiment stations and botanic gardens in all the French colonies.

Equipment.—Laboratories for original investigations and propagating houses.

Lines of work.—Administrative work in connection with the French colonial stations and botanic gardens, which are furnished with seeds and plants by the Colonial Garden; introduction and propagation of economic plants; analysis of gums, resins, caoutchouc, fibers, starches, sugars, alcohols, oils, coffee, cocoa, pepper, drugs and their adulterants; study of plant diseases.

Below is a list of the stations under the direction of the Colonial Garden:

China: Botanic Garden, Saïgon (Indo-China), Haffner, *Dir.*
Dahomey: Trial Garden, Estève.
French Guiana: Botanic Garden, Buduel, Bassière, *Dir.*
French Guinea: Trial Garden, Konakry, Teysonnier, *Dir.*
French Kongo: Trial Garden, Libreville, Couanon-Brazzaville, Luc, *Dir.*
Guadeloupe: Agricultural Chemical Station, Elot, *Dir.*
Ivory Coast: Garden of Bingerville, Joly, *Dir.*
Madagascar:
  Experiment Station, Nahanisana, Prudhomme, *Dir.*
  Experiment Station, Tamatave, Deslandes, *Dir.*
Martinique: Botanic Garden, St. Pierre, Nollet, *Dir.*
New Caledonia: Garden, Esse, *Dir.*
Réunion: Botanic Garden, St. Denis, Léon Châtel, *Dir.*
Senegal: Experiment Station, St. Louis, Perruchot, *Dir.*
Sudan: Experiment Station, Koylikoro, Jean Vuillet, *Dir.*
Tunis: Botanic and Trial Garden, Tunis, L. Guillochon, *Dir.*

Laboratory, Olmet, Cantal.

Governing board.—Ministry of Agriculture.

Station staff.— ——— ———, *Dir.*

Origin.—Established in 1893 by Duclaux.

Equipment.—Three rooms in a building belonging to Duclaux.

Income.—For 1902, $77.20 from the Ministry of Agriculture.

Lines of work.—Analysis of waters.

Agricultural Laboratory, Orléans, Loiret.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—Duplessis, *Dir.;* Piégard, *Lab. Asst.*

Origin.—Established July 2, 1888, by the Department of Loiret.

Equipment.—Two large laboratories and an office in a rented building.

Income.—For 1902, $2,412.50 (Ministry of Agriculture, $193; department, $1,717.70; fees, $501.80).

Lines of work.—Analysis of soils, fertilizers, water, seeds, etc. The director is conducting somewhat extensive experiments with American phylloxera-resistant vines.

Entomological Station of Paris, 16 rue Claude-Bernard, Paris.

Governing board.—Ministry of Agriculture and the National Agricultural Institute.

Station staff.—Dr. Paul Marchal, *Dir.*

Origin.—Established by the Ministry of Agriculture in March, 1894, at the National Agricultural Institute.

Equipment.—Two rooms containing entomological apparatus.

Income.—For 1902, $1,254.50 from the Ministry of Agriculture.

Lines of work.—Determination of useful and noxious insects and dissemination of information regarding means of combating the latter.

Agricultural Station of the East, 48 rue de Lille, Paris.

Governing board.—Ministry of Agriculture and the National Society for the Encouragement of Agriculture.

Station staff.—Prof. L. Grandeau, *Dir.;* E. Bartmann, *Chem.;* F. Alba, *Asst.*

Origin.—The Agricultural Station of the East was founded at Nancy by L. Grandeau in 1868, and since that time has been under his continuous direction. In 1890 Grandeau transferred his station to Paris.

Equipment.—A rented laboratory at 48 rue de Lille, and an experiment field of about 1¾ acres at the Parc des Princes, avenue Victor Hugo.

Income.—For 1902, $2,991.50 (Ministry of Agriculture, $1,544; fees, $1,447.50).

Lines of work.—Laboratory investigations in agricultural chemistry, including analyses and research work for private persons, for which fees are collected; field experiments with various manures and commercial fertilizers and with field crops.

Laboratory of Fermentations, rue de l'Arbalète, Paris.

Governing board.—Ministry of Agriculture and the National Agricultural Institute.

Station staff.—E. Kayser, *Dir.*

Origin.—Established by the Ministry of Agriculture in March, 1888, and placed under the management of the National Agricultural Institute.

Equipment.—A chemical laboratory and several laboratories devoted to bacteriological and other special investigations.

Income.—For 1902, $1,987.90 from the Ministry of Agriculture.

Lines of work.—Scientific investigation of problems arising in the process of brewing and distilling and of all products affected by ferments, including those of wine, cider, and milk; analysis of air, water, and soils.

Station of Vegetable Pathology, 11 rue d'Alésia, Paris.

Governing board.—Ministry of Agriculture.

Station staff.—G. Delacroix, *Dir.;* Lebrun, *Lab. Asst.*

Origin.—Installed as a department of the National Agricultural Institute in November, 1888, by Prillieux.

Equipment.—A well-equipped laboratory, a collection of types of vegetable parasites, and an experimental field.

Income.—For 1902, $3,350.48 from the Ministry of Agriculture.

Lines of work.—Investigation of diseases of plants. The station identifies plant diseases and gives directions for their suppression. All work done for farmers is gratuitous.

Seed Testing Station, Paris.

Governing board.—Ministry of Agriculture and the National Agricultural Institute.

Station staff.—E. Schribaux, *Dir.;* Léon Bussard, *Form.;* Étienne, *Helper.*

Origin.—Organized April 15, 1884, in connection with the National Agricultural Institute.

Equipment.—A laboratory and a small experiment field.

Income.—For 1902, $2,586.20, from the Ministry of Agriculture.

Lines of work.—Seed control and microscopic analysis of flours and feeding stuffs. In the laboratory seeds are examined to determine their purity and germinative power and in the field variety tests and cultural experiments are conducted.

Station for Testing Agricultural Implements, 47 rue Jenner, Paris.

Governing board.—Ministry of Agriculture.

Station staff.—M. Ringelmann, *Dir.;* mechanicians and helpers.

Origin.—Founded in December, 1888, by the Ministry of Agriculture.

Equipment.—A laboratory fitted with dynamometers, indicators, registers, balances, and various other instruments of precision for testing farm and manufacturing implements.

Income.—For 1902, $2,026.50, from the Ministry of Agriculture.

Lines of work.—The testing of all sorts of farm and manufacturing implements, motors, automobiles, etc., to determine their capacity, the quality of work done, the cost of operation, the approximate wear and tear, draft, etc. Annual reports of tests are made in the Bulletin of the Ministry of Agriculture (*Ministère de l'Agriculture Bulletin*).

Laboratory of the General Transportation Company, Paris.

Station staff.—Prof. L. Grandeau, *Dir.*

Origin.—Founded in 1880 by the General Transportation Company of Paris and since that time maintained at the expense of this corporation.

Equipment.—Laboratory.

Lines of work.—The station has two distinct purposes: (1) All the feed for the horses of the company is analyzed and the daily ration of the horses is based on the results; (2) for twenty years L. Grandeau and his assistants have conducted a series of experiments on the feeding of the draft horse.

Agricultural Station, Pétré, Vendée.

Governing board.—Ministry of Agriculture and the School of Practical Agriculture.

Station staff.—Touchard, *Dir.;* M. Bonnétat, *Chem.*

Origin.—Established in 1888 by Vauchez, aided by government funds.

Equipment.—Laboratory and demonstration fields.

Income.—For 1902, $1,235.20, from the Ministry of Agriculture.

Lines of work.—Gratuitous analysis for farmers of a large number of samples of fertilizers, soils, and agricultural products; scientific investigation of agricultural problems, including the study of fermentation in silage and the investigation of means for combating phylloxera and other pests of the vine; field demonstrations; and the control of cooperative dairies.

Agricultural Laboratory, Poitiers, Vienne.

Governing board.—Ministry of Agriculture and the Poitiers Faculty of Sciences.

Station staff.—Léon Roux, *Dir.;* Renault, *Lab. Asst.;* a helper.

Origin.—Established December 28, 1887, by the Poitiers Faculty of Sciences.

Equipment.—Seven rooms in the Poitiers Faculty of Sciences building.

Income.—For 1902, $1,235.20 (Ministry of Agriculture, $193; department, $1,042.20).

Lines of work.—Analysis of soils, fertilizers, waters, wine, vinegar, and milk.

Agricultural Station, Rennes, Ille-et-Vilaine.

Governing board.—Ministry of Agriculture and the Rennes Faculty of Sciences.

Station staff.—Séguin, *Dir.;* Artus and Grien, *Lab. Assts.*

Origin.—Established in April, 1878, by the Ministry of Agriculture and Lechartier.

Equipment.—Four rooms in the Faculty of Sciences building, a greenhouse, an experimental field of 1¼ acres at the Practical School of Agriculture of Crois-Croix.

Income.—For 1900, $2,238.80 (Ministry of Agriculture, $1,042.20; Ministry of Public Instruction, $173.70; department, $810.60; fees, $212.30).

Lines of work.—Analysis of soils, fertilizers, water, apples, flours, oil cakes, cider, etc., and pomological investigations.

Agricultural Station, Rethel, Ardennes.

Governing board.—Ministry of Agriculture and the School of Practical Agriculture of Rethel.

Station staff.—Coutte, *Dir.;* De Gironcourt, *Lab. Asst.*

Origin.—Established November 1, 1893, at the expense of the Government and Linard, a member of the Chamber of Deputies.

Equipment.—Two rooms in the School of Practical Agriculture and an experiment field of 1 acre.

Income.—For 1902, $810.60 (Ministry of Agriculture, $617.60; fees, $193).

Lines of work.—Analysis of soils, fertilizers, and forage crops.

Agricultural Station, Rouen, Seine-Inférieure.

Governing board.—Ministry of Agriculture.

Station staff.—A. Houzeau, *Dir.;* Sprecher, *Asst.* The director has the assistance of several men at the station, and also the cooperation of a score or more of trained men who have charge of the demonstration fields of the Department of Seine-Inférieure.

Origin.—Established May 1, 1883, by the department.

Equipment.—Several laboratories for technical experiments; one research laboratory; a garden for cultural experiments; an orchard containing many varieties of apples and pears from which scions for grafting are taken and distributed among the fruit growers of the department; the control of a number of demonstration fields.

Income.—For 1902, $4,940.80 (Ministry of Agriculture, $193; Ministry of Public Instruction and local contributions, $4,632; fees, $328.10).

Lines of work.—Analysis of mineral and organic manures, soils, waters, feeding stuffs, milk, butter, cider fruits, ciders, etc.; investigation of problems in agriculture and agricultural chemistry; and station extension work, which includes the distribution of scions from improved varieties of cider fruits, and demonstrations in growing wheat, oats, rape, flax, sugar beets, and other crops, in destroying charlock with iron sulphate, and in rational stock feeding. Analyses for the cultivators of the department are gratuitous.

Agricultural Entomological Laboratory, Rouen, Seine-Inférieure.

Governing board.—Ministry of Agriculture.

Station staff.—Paul Noël, *Dir.;* two helpers.

Origin.—Established October 1, 1890, by the Department of Seine-Inférieure.

Equipment.—Nine rooms in a rented building and a garden of 1¼ acres.

Income.—For 1902, $2,219.50 (Ministry of Agriculture, $772; department, $1,447.50).

Lines of work.—Determination of useful and noxious insects.

Agricultural Laboratory, St. Étienne, Loire.

Governing board.—Ministry of Agriculture and the School of Mines at St. Étienne.

Station staff.—Babu, *Dir.;* Ville, *Lab. Asst.*

Origin.—Established in 1890 at the request of the Department of Loire.

Equipment.—Building containing three rooms and cellar.

Income.—For 1902, $984.30 (Ministry of Agriculture, $57.90; Ministry of Public Works, $154.40; department, $96.50; School of Mines, $193; fees, $482.50).

Lines of work.—Analysis of fertilizers and water.

Dairy Station, Soligny, Jura.

Friaut, *Dir.*

Agricultural Station, Toulouse, Haute-Garonne.

Governing board.—Ministry of Agriculture and Toulouse Faculty of Sciences.

Station staff.—Fabre, *Dir.;* Prunet, *V.-Dir.;* Gayand, *Form.;* a gardener.

Origin.—Established October 24, 1892, by the Ministry of Public Instruction.

Equipment.—The laboratory facilities of the station are in a building of the University of Toulouse, and include four agricultural-

chemical laboratories, three botanical laboratories, a microscope room, two workrooms, a balance room, and a museum. The station also has access to the Observatory of Toulouse and an experimental field of 2½ acres.

Income.—For 1902, $1,341.35 (Ministry of Agriculture, $579; Ministry of Public Instruction, $579; department, $183.35).

Lines of work.—Analysis of soils, fertilizers, waters, feeding stuffs, and seeds.

Enological Station, Toulouse, Haute-Garonne.

Governing board.—Ministry of Agriculture.

Station staff.—J. Vincens, *Dir.;* Lacassagne, *Lab. Asst.*

Origin.—Established June 30, 1900, by decree of the Ministry of Agriculture, with the aid of the city of Toulouse.

Equipment.—Five rooms in a building belonging to the city.

Income.—For 1902, $1,794.90 (Ministry of Agriculture, $1,717.70; department, $38.60; agricultural society, $38.60).

Lines of work.—Wine making; scientific investigations in connection with the wine-making industry; and the analysis of musts, wines, and grapes.

Agricultural Laboratory, Tours, Indre-et-Loire.

Governing board.—Ministry of Agriculture.

Station staff.—L. Robin, *Dir.;* Bertrand, *Lab. Asst.*

Origin.—Established July 10, 1890, by M. Chataignier and Robin with the cooperation of the Department of Indre-et-Loire.

Equipment.—Three rooms furnished by the town.

Income.—For 1902, $1,968.60 (Ministry of Agriculture, $579; department, $636.90; fees, $752.70).

Lines of work.—Analysis of soils, fertilizers, water, seeds, and building materials; and studies of methods of vinification.

Departmental Agricultural Station, Versailles, Seine-et-Oise.

Governing board.—Ministry of Agriculture and the departmental professor of agriculture.

Station staff.—Rivière, *Dir.;* Bailhache and Duhamel, *Lab. Assts.*

Origin.—Established July 1, 1885, by the General Assembly of Seine-et-Oise.

Equipment.—Five rooms in the departmental building at the prefecture, and an experiment field of about 5 acres at Martinière.

Income.—For 1902, $2,509 (Ministry of Agriculture, $193; department, $2,316).

Lines of work.—Analysis of soils, fertilizers, water, and feeding stuffs; seed testing, and field experiments.

Horticultural Research Laboratory, Versailles, Seine-et-Oise.

Governing board.—Ministry of Agriculture.

Station staff.—A. Petit, *Dir.*

Origin.—The laboratory was organized in connection with the National School of Horticulture at Versailles.

Equipment.—A laboratory and the gardens of the School of Horticulture, which cover about 25 acres.

Income.—For 1900, $636.90 from the Ministry of Public Instruction.

Lines of work.—Research work in fruit and vegetable gardening, cultivation under glass, and nursery operations.

Station of Vegetable Physiology, Villa Thuret.

Prof. George Pairault, *Dir.*

Viticultural and Vegetable Pathological Station, Villefranche-sur-Saône, Rhône.

Governing board.—Entirely under the control of the director.

Station staff.—V. Vermorel, *Dir.;* an entomologist, a chemist, a botanist with two assistants, a librarian, and a photographer, and a number of student aids from schools of agriculture.

Origin.—Established in 1887 by V. Vermorel.

Equipment.—Two laboratories, micrographic, photographic, and entomological rooms and equipment; museum with collections; library of 12,000 volumes on viticulture and vegetable pathology (280 periodicals received per month); experiment fields and cellars, trial grounds.

Income.—Maintained at the expense of the director.

Lines of work.—Investigations in grape production, wine making, and vegetable pathology, especially the enemies of cultivated plants. Numerous publications are issued.

FRENCH KONGO.

Trial Garden, Libreville.[a]

Station staff.—Luc, *Dir.*

Origin.—Supposed to have had its origin in the Kérellé Garden, which was established about 1850 and several times abandoned and restored. The garden as now constituted, however, was established in 1887.

Equipment.—Trial grounds covering about 40 acres under cultivation.

Income.—Budget for 1901, $2,925.88.

Lines of work.—Culture and distribution of varieties of cacao, vanilla, coffee, cloves, pepper, bananas, oranges, and other tropical productions, and ornamental trees; the introduction of forage plants, fruits, and vegetables.

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[a] See Colonial Garden, Nogent-sur-Marne, p. 111.

GERMAN EAST AFRICA.

Biological Agricultural Institute, Amani.

Station staff.—Prof. A. Zimmerman, *Dir. and Bot.;* chemist, zoologist, secretary, and three planters.

Origin.—Established in 1902 by the government of German East Africa.

Equipment.—Laboratory and dwelling erected in 1902 at a cost of $15,946.

Income.—For 1902, $18,574.

Lines of work.—Investigation of the food requirements and habits of growth of tropical cultivated plants; study of their insect pests and fungus diseases and of means for combating them; analysis of soils and fertilizers; examination of animal and vegetable products intended for export or for home consumption; study of the flora and fauna of German East Africa.

Agricultural Experiment Station, Usambara.

In 1896 a station was established at Usambara for the purpose of determining the adaptability of the country west of the Luengera to tropical agriculture, general agriculture, and stock raising. Experiments are conducted at different altitudes with native and introduced tropical plants to determine those best suited to cultivation in that region. Later the station is to supply these plants and seeds on a commercial scale. Another object of this station is to ascertain how far the country may be suited to the colonizing of German settlers, the amount of capital required to start in different kinds of farming, and the probable profits.

GERMANY.

In Germany there is no central department of agriculture, no central authority having control of experiment stations or agricultural education, no uniform system of management for these institutions. The Empire is a confederation of 26 states (kingdoms, grand duchies, duchies, and free states), each having its own system of government so far as the management of local affairs is concerned. Only one of these states, Prussia, maintains a department of agriculture distinct from other departments of the Government; others place the administration of agricultural interests under the department of the interior or some other branch of the Government. From this condition of affairs it naturally follows that there are no federal experiment stations in Germany. Nor were the German experiment stations organized by the states, but for the most part by associations of farmers, brewers, and other patrons, by whom they were at first almost entirely supported and from whom they now receive more than two-thirds of their funds,

either through societies or as fees. Nearly all of the stations are subsidized by their respective governments, but few of them receive from this source all that is needed for running expenses.

The management of the stations is as far from uniform as were the methods of establishing them. Some are under the direct control of the state or provincial departments of agriculture, some under the management of schools with which they are connected, some under committees appointed by societies, and others combine two or even three of these methods. The only real bond of union between German experiment stations is found in the Association of Agricultural Experiment Stations in the German Empire, which was organized at Weimar, January 22, 1888, for the purpose of securing the "greatest practicable uniformity in the examination and control of fertilizers, feeding stuffs, seeds, and other important agricultural supplies." This association meets annually and discusses not only analytical methods, but also matters concerning nomenclature, valuation of nutrients, training and placing of assistants, and other questions of policy. The association has proven so satisfactory that the need of federal organization has not been felt in Germany.

Seed Control Station, Arendsee, Saxony.

Governing board.—Under the management of the Agricultural Winter School at Arendsee, with which it is connected.

Station staff.—Dr. P. Herzberg, *Dir.*

Origin.—Founded in 1877.

Income.—No account is taken of the receipts and expenditures, which are very small.

Lines of work.—Seed control.

Agricultural Experiment Station, Augsburg, Bavaria.

(Institute for Agricultural Investigation.)

Governing board.—Under the control of the agricultural societies of Schwaben and Neuburg.

Station staff.—Dr. M. Hagen, *Dir.;* Drs. W. Meyer and A. von Hösslin, *Assts.;* one helper.

Origin.—Established in 1865 at Memmingen by six agricultural district committees; removed to Augsburg 1869.

Equipment.—A modern laboratory in a special building.

Income.—For 1903, $2,856 (agricultural societies of Schwaben and Neuburg, $238; fees, $2,618).

Lines of work.—Investigation of fertilizer problems and control of fertilizers, feeding stuffs, seeds, foods, milk and dairy products. Questions along the line of agricultural chemistry suggested by the administration receive attention. Contracts are made with manufac-

turers and merchants to establish the guaranty of their wares and to investigate or settle questions of dispute between them and their customers.

Agricultural Experiment Station, Augustenberg, Baden.[a]

Governing board.—Ministry of the Interior of the Grand Duchy of Baden.

Station staff.—Prof. J. Behrens, *Dir.;* Dr. Loos, *Lab. Dir.;* Drs. von Wahl, Stang, Schaller, Wollny, Mass, and Fischler, *Assts.*

Origin.—Established in the summer of 1901 by uniting the two stations in Karlsruhe (the Agricultural Chemical Experiment Station established in 1859 and the Agricultural Botanical Experiment Station established in 1872) and moving them to Augustenberg.

Equipment.—Pending the erection of buildings, the station occupies a building belonging to the Augustenberg Agricultural School, and also uses for experimental purposes the extensive fields and vineyards belonging to the school.

Income.—The estimated income for 1903, $7,487.48.

Lines of work.—Investigations in plant physiology (vines, tobacco, hops, hemp, etc.); control of fertilizers, feeding stuffs, and seeds.

Institute for Fermentation Industries and Starch Manufacture, Seestrasse, Berlin, Prussia.

Governing board.—Doctor Thiel, of the Ministry of Agriculture; Doctor Althoff, of the Ministry of Education, and Professor Orth, rector of the Royal Agricultural High School of Berlin.

Station staff.—Prof. Max Delbrück, *Dir.;* Professor von Eckenbrecher, Engineer W. Goslich, Profs. W. Windisch, P. Lindner, Struve, G. Heinzelman, F. Goldiner, Doctors Matthes, Hanow, Profs. F. Schönfeld, Th. Remy, Drs. F. Rothenbach, J. F. Hoffmann, H. Lange, Engineer Haack, Doctors Parow, Henneberg, Engineer Fehrmann, and Doctor Mohr, *Chiefs of Div.;* Doctors Wilke, Neumann, Behrend, Rommel, Keil, Bode, Sierig, Deinhardt, Lühder, Schulze, Wagner, Ulrich, Foth, Ploetz, Stockhausen, Grosse, Ellroth, Rudzick, Bartels, Wetzel, Philippi, Stiegeler, Hoffmann, von der Heide, Rülke, Wenzel, Schönewald, Hayduck, Eberlein, Engineer Schinner, Doctors Dehnicke, Hinrichs, Hildebrandt, Richter, and Pickardt, *Assts.*

Origin.—The institute was organized as the result of a popular demand for instruction and scientific investigation in industries related to brewing, distilling, and starch production. In addition to divisions representing each of these industries, it also includes a machinery and technical division, a division of soil bacteriology of the Chamber of Agriculture of the Province of Brandenburg, a division of steam engi-

[a] Post-office address, *Grötzingen.*

neering, an experimental granary, a German potato culture station, a barley culture station, and a hop-culture station.

Equipment.—Experimental laboratories, machine testing room, machinery and equipment necessary for the manufacture on a wholesale scale of the respective product of each division, 15 acres of land. The grounds and extensive buildings belong to the Government, but the machinery and the equipment and all the funds necessary for carrying on the work of the station are provided by the following societies: Association of German Distillers (von Grass), Association of German Starch Manufacturers (von Freier), Association of German Corn Distillers and Compressed Yeast Manufacturers (Baron von Gillhaussen), Association of German Vinegar Manufacturers (C. Moskopf), Association of Brewers in Berlin (vacant). Each society, through its representative (mentioned in parentheses above), has charge of the particular work of its department.

Income.—The institute received in 1902, from the various societies mentioned above, about $228,480.

Lines of work.—The manufacture of malt and distilled liquors, starch, vinegar, etc.; investigation of chemical and bacteriological problems in connection with the production of these commodities; testing machinery used in breweries, distilleries, etc.; cultural and fertilizer experiments with barley, potatoes, and hops.

Experiment Station for Milling, Invalidenstrasse, 42, Berlin.

Governing board.—Royal Prussian Ministry of Agriculture.

Station staff.—Prof. L. Wittmack, *Dir.;* Dr. C. Brahm, *Asst. Chem.;* Dr. T. Buchwald, *Asst. Bot.*

Origin.—Organized in 1899 by the Association of German Millers.

Equipment.—Connected with the Royal Agricultural High School of Berlin, and makes use of its buildings. The necessary apparatus is provided by the Association of German Millers.

Income.—For 1901, $2,620.

Lines of work.—Investigation of flour and bran for the Board of Customs, Agricultural Ministry, Millers' Union, and private persons; also of oil cakes and feeding stuffs for private persons; giving advice to millers and bakers; investigation of the baking qualities of varieties of wheat (especially the German, Russian, and American varieties), and of methods of estimating starch, ash, fat, etc., in flour and bran; determination of the rôle of lactic-acid and butyric-acid bacteria in baking processes; gluten studies.

Biological Division for Agriculture and Forestry of the Royal Board of Health, Berlin.

Governing board.—Doctor Köhler, *Pres.*

Station staff.—Dr. Rud. Aderhold, *Dir. and Plant Physiol.;* Doctor

Moritz, *Agr. Chem.;* Doctor Rörig, *Zool.;* Doctor Maassen, *Bact.;* Doctor Scherpe, *Asst. Agr. Chem.;* Doctor Appel, *Plant Physiol.;* Doctors Krüger and Laubert, *Assts. Plant Physiol.;* Doctor Börner, *Asst. Zool.;* Doctor Peters, *Asst. Bact.;* Holleufer, *Chief Clerk;* two helpers; one head gardener; three gardeners; workmen.

Origin.—Established in 1898 as a government institution.

Equipment.—Five well-equipped laboratories in the office building of the Royal Board of Health; a 25-acre experiment field with a small laboratory, two large insectaries, and four plant houses at Dahlem, near Berlin, where it is the intention to erect a large number of buildings for this division.

Income.—Funds provided by the Royal Board of Health.

Lines of work.—Investigations in economic ornithology and entomology, including methods of combating the pea weevil, gypsy moth, etc.; chemical studies; study of plant diseases and soil bacteriology; experiments with fertilizers on wheat, with metallic salts for the destruction of weeds, and with legumes to study the function of tubercles; apiculture, and pisciculture. Results of investigations are published in circulars and in *Arbeiten der biologischen Abtheilung für Land- und Forstwirthschaft am Kaiserlichen Gesundheitsamte.*

Chemical Laboratory of the Sugar Industry Union of Germany, Berlin.

Governing board.—Directors of the Sugar Industry Union; Gustavus König (*Pres.*), *Berlin;* Doctor Barts, *Brunswick;* Doctor Preissler, *Linden.*

Station staff.—Prof. A. Herzfeld, *Dir.;* Schrefeld, Doctors Stiepel, Ehrlich, Schütz, *Assts.*

Origin.—Founded in 1867 under the auspices of the Sugar Industry Union of Germany; connected with the Agricultural High School of Berlin in 1890.

Income.—Supported by the Sugar Industry Union.

Lines of work.—Improvement of sugar technology, scientific investigations in all phases of beet-sugar production, analytical work.

Agricultural Experiment Station, Bernburg, Anhalt.

Governing board.—President of the ducal government of Anhalt, three representatives of the Association of the Beet Sugar Industry of the German Empire, and the director.

Station staff.—Prof. H. Wilfarth, *Dir.;* Drs. H. Roemer, G. Wimmer, G. Geisthoff, Bufleb, and G. Heikel, *Assts.;* two laboratory assistants.

Origin.—Founded in 1882 by the State on the site of the school in Bernburg.

Equipment.—A three-story laboratory building; preparation house; greenhouse and shelter shed, provided with car tracks, which facilitate

the moving of pots back and forth. The laboratory building contains a well-equipped chemical laboratory, balance room, dark room, offices, storerooms, etc., and apartments for the director and his assistants.

Income.—For 1903, $8,568 (State, $3,808; societies, $4,760).

Lines of work.—The investigation of problems in the growth and nutrition of plants, especially sugar beets, by the sand-culture method perfected by Hellriegel. Among the problems studied, that relating to the source of nitrogen for leguminous plants is one of the most important. It was through the investigations of Hellriegel and Wilfarth at this station that the relation between root-tubercle bacteria and the fixation of nitrogen was discovered. The investigation of fertilizers has also been an important line of work.

Agricultural Experiment Station, Bonn, Prussia.

Governing board.—Five members elected from the Agricultural Society of the Rhine Province and the director of the station.

Station staff.—Dr. E. Herfeldt, *Dir.;* Drs. F. Kretchmer and H. Hecker, *Chiefs of Div.;* 4 assistants; 3 laboratory assistants; a secretary; 2 clerks; 4 to 6 helpers; and 2 servants.

Origin.—Founded in 1855 by the Agricultural Society of the Rhine Province, and since 1898 has included three divisions: (1) Division for testing manures, fertilizers and soils; (2) division for testing feeding stuffs and seeds, and (3) division for testing milk and dairy products.

Equipment.—A laboratory building containing 4 rooms in the basement, 8 on the ground floor, and 3 in the wings. For field experiments it has the use of several fields in different localities.

Income.—For 1903, $13,566 (State, $1,190; province, $714; fees, $11,662).

Lines of work.—Scientific experiments in the interest of agriculture and the investigation of diseases of plants and animals. The station is authorized to train food chemists and is the official laboratory for testing food.

The Institute of Animal Physiology of the Agricultural Academy (Poppelsdorf), Bonn.

Governing board.—Under the administration of the Agricultural Academy.

Station staff.—Prof. Oscar Hagemann, *Dir.;* Drs. W. G. Kummer, N. N. Bischofswerder, and E. H. Stein, *Assts.*

Origin.—Founded in 1856 by the State for chemical and horticultural work; since 1894 devoted entirely to investigations in animal physiology.

Equipment.—Stables and laboratories for experiments in metabolism, animal chemistry, and physiology. A respiration calorimeter is being constructed.

Income.—For 1903, State appropriation of $1,500, not including salaries.

Lines of work.—Feeding and metabolism experiments, investigations in animal physiology and chemistry.

Agricultural Experiment Station and Field of the Agricultural Academy (Poppelsdorf), Bonn.

Governing board.—Under the administration of the Agricultural Academy.

Station staff.—Prof. F. Wohltmann, *Dir.;* Drs. Th. Schneider, Arthur Golf, A. Hecker, and H. Maas, *Assts.*

Origin.—Established in 1856 by the State; reorganized in 1901.

Equipment.—Chemical, physical, botanical, and bacteriological laboratories; barns, plant house, and experiment field.

Income.—About $714 from the State, not including salaries.

Lines of work.—Chemical investigations, including the analysis of soils, fertilizers, agricultural products, etc.; investigations in the respiration of plants and in processes of decomposition by fermentation and putrefaction; studies in connection with nitrification, and field experiments.

Moor Experiment Station, Bremen, Bremen.

Governing board.—Prussian Central Commission on Moor Affairs, Dr. M. Fleischer, *Chair., Berlin.*

Station staff.—Prof. Br. Tacke, *Dir.;* Dr. A. Salfeld, *Culture Expert at Lingen;* Dr. H. Minssen, *Lab. Dir.;* Dr. C. Weber, *Bot.;* Doctors Arntz, Dudy, Spiecker, Reimann, Herwig, Arnd, and Dempwolff, *Assts. Chem.;* Menkhaus, Schmitz, Vorpahl, and Karstens, *Pract. Educated Farmers;* 2 secretaries; 1 house master; 3 helpers.

Origin.—Founded in 1877 by the Prussian Central Commission on Moor Affairs.

Equipment.—Laboratory building erected by the Bremen authorities; equipment furnished by the Prussian Ministry of Agriculture.

Income.—For 1903, $17,814.30 (Prussian State, $14,482.30; Bremen Agricultural Society, $95.20; fees, $3,236.80).

Lines of work.—Investigations on moor soils in their relation to plant growth, changes produced in them by standardized reagents and by drying at high and low temperatures, their content of free ulmic acid, their content of plant food under various conditions determined by means of accurate field experiments; analytical determination of the changes produced in high moor fields and meadows by cultivation and manuring; the value of turf as a conservator of heat; microscopic botanical investigation of the origin and composition of various moor soils.

Seed Control Station of the Agricultural School, Bremervörde, Prussia.

Governing board.—Under the control of the Agricultural School.

Station staff.—Doctor Würz, *Dir.*

Origin.—Founded in 1876 by the Provincial Agricultural Society of Stade.

Income.—Fees for analysis of seeds.

Lines of work.—Seed control.

Agricultural Botanical Experiment and Seed Control Station, Matthias Place, 6, Breslau, Prussia.

Governing board.—Prof. F. Pax, *Sec.;* Dr. V. Kutzleb, *Breslau;* Von Nitzchwitz, *Polnischdorf;* Von Wallenberg, *Schmolz.*

Station staff.—Dr. W. Grosser, *Dir.;* A. Estoppey and R. Kirchner, *Assts.;* an office assistant and a helper.

Origin.—Founded in 1875 by the Breslau Agricultural Society.

Income.—For 1902, $2,451.40 (Breslau Agricultural Society, $309.40; seed testing, $2,142).

Lines of work.—Study of plant diseases, seed testing, and seed control. Headquarters for information regarding plant diseases and plant protection in Silesia and Posen.

Agricultural Experiment and Control Station, Matthias Place, 6, Breslau.

Governing board.—A chemist of the University of Breslau, two practical farmers, the general secretary of the Ministry of Agriculture, and the director of the station.

Station staff.—Prof. B. Schulze, *Dir.;* Dr. H. Neubauer, *V.-Dir. and Chief Div. of Micros.;* Dr. V. Schenke, *Chief Div. of Chem.;* Doctor Bialon, *Chief Div. of Milk Control;* Doctors Moschatos, Frank, Krannich, Werner, Blümel, *Assts. Chem.;* Doctor Seifart, *Asst. Bot.;* Doctor Doll, *in charge of Veg. Sta.*

Origin.—Founded in 1856 by the Agricultural Central Society of Silesia at Ida-Marienhütte; removed to Breslau in 1877. In 1897 a branch station at Rosenthal was established.

Equipment.—A well-equipped laboratory in Breslau and a branch vegetation station in the Rosenthal suburb where are farm buildings and nearly 80 acres devoted to experiments.

Income.—For 1903, $13,720.60 (State, $1,820.60; fees, $11,900).

Lines of work.—Experiments in the nutrition of animals and plants, control of fertilizers and feeding stuffs, the training of food chemists, soil investigations, variety tests, and other experiments with field crops.

Agricultural Chemical and Bacteriological Institute of the University, Breslau.

Governing board.—Under the control of the Ministry of Agriculture.

Station staff.—Prof. Th. Pfeiffer, *Dir.;* Drs. A. Einecke and W. Schneider, *Assts.*

Origin.—Founded in 1869 as Experiment Station for Animal Physiology at Proskau; removed in 1881 to Breslau; broadened in 1898 to its present scope.

Equipment.—Laboratory and experiment stalls.

Income.—For 1903, $987.70 from the State.

Lines of work.—Investigations in animal physiology, agriculture, chemistry, and bacteriology.

Institute for Agricultural Plant Production of the University, Breslau.

Governing board.—Under the control of the Ministry of Religion and Public Instruction.

Station staff.—Prof. K. von Rümker, *Dir.;* Doctor Borman, *Administrator;* Drs. H. Hoffmann and Fander, *Assts. Chem.;* H. Thomas, *Gard.*

Origin.—Founded in 1898 by the Ministry of Religion and Public Instruction.

Equipment.—Experiment field of 80 acres at Rosenthal, near Breslau; chemical, physiological, and pedological (soils) laboratories; agricultural botanical garden; meteorological apparatus; and collections, including specimens of soils, plant diseases, trees, and economic plants.

Income.—For 1901, a State subsidy of $4,114.84, and receipts from sale of farm products amounting to about $1,550.

Lines of work.—Experiments in plant production, including green manuring, methods of culture, selection, etc.; investigation of soils and study of plant diseases.

University Institute of Animal Chemistry, Breslau.

Governing board.—Under the control of the Ministry of Agriculture.

Staff.—Prof. H. Weiske, *Dir.*

Lines of work.—Nutrition investigations, digestion experiments, and chemical investigation of feeding stuffs.

Experiment Station, Brunswick.

Governing board.—President of the Brunswick Agricultural Central Society for Chemical Technology (*Chair.*), six members of the central committee, the general secretary, and the director of the station.

Station staff.—Prof. Hugo Schultze, *Dir.;* Drs. O. Göttschke and Bernstein, *Assts.;* one clerk; three laboratory assistants.

Origin.—Founded in 1862 by the then Society for Agriculture and Forestry which is now the Agricultural Central Society for Chemical Technology.

Income.—For 1903, $5,878 from the State, fees, and other sources.

Lines of work.—Investigation and control of fertilizers, feeding stuffs, seeds, foods, and condiments; fertilizer experiments.

Imperial Agricultural Experiment Station, Colmar, Alsace-Lorraine.

Station staff.—Prof. Paul Kulisch, *Dir.;* Dr. Max Passon, *V.-Dir.;* Doctors Küllenberg, Naumann, and Fauth, *Assts.;* Lozeron and Ley, *Techs.;* three helpers.

Origin.—Founded by the State in 1874 at Rufach; removed to Colmar in 1896.

Equipment.—Laboratory and apparatus for exact fertilizer experiments at Colmar, experiment field at Rufach.

Income.—For 1903, $9,339.12 (State, $5,412.12; experiment fund, $1,190; fees and miscellaneous, $2,737).

Lines of work.—Agricultural investigations and experiments, especially in the production of wine, hops, and tobacco; investigations in plant physiology, bacteriology, and pure-yeast cultures; control of fertilizers, feeding stuffs, seeds, foods, and condiments; training of food chemists.

Agricultural Experiment Station, Dahme, Prussia.

Governing board.—Board of directors of the Chamber of Agriculture of the Province of Brandenburg.

Station staff.—Prof. R. Ulbricht, *Dir.;* Dr. O. Förster, Dr. G. Meissner, Fr. Haussding, E. Pescheck, E. Müller, *Assts. Chem.;* Wilh. Laschke, *Asst. Bot.;* Doctor Mann, *Asst. in Veg. Expts.*

Origin.—Opened in 1857 by an agricultural union of the Jüterbog-Luckenwalder Circle; came under the control of the Chamber of Agriculture in 1896.

Equipment.—Three vegetation houses equipped with pots for indoor experiments, sunken zinc cylinders under movable roof and side walls, and an experiment garden.

Income.—For 1902–3, $6,717.42 (State, $2,427.60; Chamber of Agriculture, $285.60; fees, $3,905; miscellaneous, $99.22).

Lines of work.—Analysis of fertilizers, feeding stuffs, seeds, etc.; pot and field experiments with various fertilizers, leguminous plants to determine fixation of atmospheric nitrogen, plants for green manuring, and varieties of potatoes and maize; feeding experiments and dairy experiments.

Agricultural Experiment and Seed Control Station, Danzig, Prussia.

Governing board.—(Vacant).

Station staff.—Dr. M. Schmoeger, *Dir.;* Dr. von Wissell, von Wülcknitz, J. Goerbing, and R. Lucks, *Assts.;* two helpers.

Origin.—Founded in 1877 by the Agricultural Central Society of West Prussia.

Equipment.—A well-equipped laboratory for experiments in chemistry, seed control, and microscopical examination of feeding stuffs.

Income.—For 1903, $7,120 (State, $2,391.90; province, $1,023.40; fees, $3,704.70).

Lines of work.—Analysis of fertilizers, feeding stuffs, seeds, etc. Field experiments and scientific investigations in the laboratory.

Agricultural Experiment Station, Darmstadt, Hesse.

Governing board.—Two representatives from each of the three agricultural societies of the duchy and one representative from the Government—Economic Counsellor Müller.

Station staff.—Prof. P. Wagner, *Dir.;* Drs. R. Dorsch, G. Hamann, R. Kunze, *Chiefs of Divs.;* F. Weidert, G. Dittmer, R. Weitzel, *Assts.;* W. Lang, *Chem.;* Meerstädter, *Lab. Asst.;* Metzger, *Bookkeeper;* four office helpers, a steward, and a gardener.

Origin.—Founded in 1871 by the ducal government cooperating with some of the leading farmers of the duchy, reorganized in 1874, and removed in 1877 to the new buildings erected for its accommodation.

Equipment.—A laboratory building, which is also the director's residence; greenhouse; several sheds, and two experiment gardens. The laboratory building contains a large laboratory room, library, director's private study, and other rooms. The station is especially equipped for the Wagner method of pot experiments.

Income.—For 1903, $19,040 (State, $9,044; fees, $9,996).

Lines of work.—Laboratory investigations in agricultural chemistry; pot and field experiments to determine the relative value of various commercial fertilizers, green manures, and barnyard manures; the causes of losses and of the incomplete utilization of nitrogen in barnyard manures; the utilization of nitrogen, phosphoric acid, and potash by cereals and legumes; the injurious effects of certain chemicals on commercial fertilizers; nutrient solutions for plant cultures, and the assimilation of atmospheric nitrogen by plants. The station exercises control over fertilizers, feeding stuffs, and seeds, and has been one of the leading agencies in the introduction of Thomas slag as a cheap source of phosphorus among the farmers in Germany.

Dairy Experiment Station of the Association of Hessian Agricultural Societies, Darmstadt.

Governing board.—Committee of the Association of Hessian Agricultural Societies.

Station staff.—Dr. R. Krüger, *Dir.;* two assistants, and two helpers.

Origin.—Founded in 1893 at Offenbach-on-the-Main by the Association of Hessian Agricultural Societies; removed in the autumn of 1900 to Darmstadt. In 1899 a bacteriological division was organized.

Income.—For 1900, $3,570 (State, $476; fees, $3,094).

Lines of work.—Investigations of milk, dairy products, and materials used in dairying; also of pure cultures for ripening cream and curing cheese.

Agricultural Chemical Laboratory, Döbeln, Saxony.

Governing board.—Under the control of the Royal Government of Saxony.

Station staff.—Prof. W. Wolf, *Dir.*

Origin.—Founded in 1872 by the government of Saxony.

Equipment.—A new laboratory completed in 1900.

Income.—For 1903, $142.80 (not including salaries and funds for building) from the State.

Lines of work.—Investigation of feeding stuffs, milk, etc., and of the physics and chemistry of fertilizers and soils.

Chemical and Physiological Experiment Station of the Veterinary High School, Dresden, Saxony.

Governing board.—The Royal Veterinary Commission.

Station staff.—Professor Ellenberger, *Dir.;* Dr. F. M. Bengen, *Chem.*

Origin.—Founded in 1862 and reorganized in 1876 by the State.

Equipment.—Uses the laboratory and equipment of the Veterinary High School.

Income.—For 1903, $833 from the State (not including salaries, equipment, or supplies, which are also furnished by the State).

Lines of work.—Chemical and physiological investigations with domestic animals.

Experiment Station for Plant Culture at the Botanic Garden, Dresden.

Governing board.—One government representative and eight members who represent the agricultural and horticultural societies of Saxony, the Tharand Forestry Academy, and the Tharand and Dresden stations themselves, which are under the same governing board.

Station staff.—Prof. O. Drude, *Dir.;* Dr. B. Steglich, *Agr.;* Ledien, *Gard. Insp.;* Dr. A. Naumann, *Asst. to the Dir.*

Origin.—Founded in 1890 by the State.

Equipment.—The agricultural division (Steglich) is provided with laboratory, vegetation house, and experiment field of 3.7 acres; the horticultural division (Ledien), with hothouses, hotbeds, experiment field of 1.25 acres, and botanic garden of 8.5 acres.

Income.—For 1903, $4,760 from the State for the agricultural division.

Lines of work.—Cultural field experiments to test methods of culture and varieties of farm crops; investigations in horticulture, climatology, and vegetable physiology and pathology; analysis and control of fertilizers and feeding stuffs.

Control Station for Fertilizers, Feeding Stuffs, Foods, and Seeds, Ebstorf, Prussia.

Governing board.—(Vacant.)

Station staff.—Dr. F. Bente, *Dir.*

Origin.—Founded in 1871 as a seed control station by the Lüneburg Provincial Agricultural and Forestry Society. In 1881 the control of fertilizers and feeding stuffs was added to the work of the station.

Equipment.—A well-equipped laboratory in the building of the agricultural school with which the station is connected.

Income.—For 1900, $54.74.

Lines of work.—Analysis and control of fertilizers, feeding stuffs, foods, and seeds.

Grand Ducal School for Pomology and Agricultural Winter School, Friedberg, Hesse.

Staff.—Doctor von Peter, *Dir.;* Prof. Karl Reichelt, *Bot.;* Ringshausen, *Preceptor and Sec.;* John, *Head Gard. and Instr.*

Origin.—Founded in 1870 as an agricultural winter school; reorganized and brought under State control in 1896.

Equipment.—Building containing chemical and physiological laboratories, office of director, library, agricultural and pomological collections, fruit and wine cellars, workrooms, etc.; fruit garden and an orchard of 32 acres.

Lines of work.—Experiments in the production and utilization of fruits, investigation of orchard pests and diseases, fertilizer experiments with fruit trees and field crops, dairy technology, and physiological experiments with fruit trees.

Dairy Experiment Station of the Dairy School, Fulda, Prussia.

Governing board.—Chairman of the Dairy Association, general secretary of the Cassel Ministry of Agriculture, one representative of the government of Cassel, one representative of the constitutional estate and town of Fulda.

Station staff.—Rud. Backhaus, *Dir.;* Doctor Krüger, *Lab. Dir.;* two laboratory assistants.

Origin.—Founded in 1895 by the Cassel Ministry of Agriculture.

Equipment.—Large chemical and bacteriological laboratory, modern dairy equipment, and cheese-making machinery.

Income.—For 1900, $3,046.40 from the Cassel Ministry of Agriculture and the Prussian Government.

Lines of work.—The station is connected with the dairy school at Fulda, and investigates dairy problems for the school. About 20,000 pounds of milk are used daily.

Experiment Station for Pomology, Viticulture, and Gardening, Geisenheim-on-the-Rhine, Prussia.

Governing board.—Royal Prussian Minister of Agriculture, Dr. Fr. Mueller.

Station staff.—Dr. J. Wortmann, *Dir. of Inst.*

Origin.—The institute with which the station is connected was founded in 1872 by the Royal Prussian Ministry of Agriculture. In addition to the investigations carried on in connection with the technical instruction at the institute, more or less independent experiments are carried on by the experiment station, which comprises three divisions, as follows:

Division for Pomology, Viticulture, and Fermentation Investigations.

Staff.—Dr. J. Wortmann, *Dir.;* Doctor Bötticher, *Asst.*

Equipment.—Laboratory building and apparatus used by both the institute and the experiment station.

Income.—For 1903, $249.90 from the State.

Lines of work.—Investigations in fruit culture, viticulture, wine production, pure-yeast cultures, and other related subjects.

Division of Applied Chemistry.

Staff.—Dr. K. Windisch, *Dir.;* Dr. K. Boehm, Ph. Schmidt, and Th. Roettgen, *Assts.;* gardener, clerk, and laboratory assistant.

Equipment.—Laboratory in a wing of the wine-press house of the institute.

Income.—For 1903, $3,169.45 (State, $2,570.40; fees, $599.05).

Lines of work.—Chemical investigations with special reference to wine production.

Division of Vegetable Pathology.

Staff.—K. Kroemer, *Dir.;* Doctor Schulz, *Asst.*

Income.—For 1903, $1,749.30 from the State.

Lines of work.—Investigation of plant diseases.

Animal Physiological Experiment Station, Göttingen, Prussia.

Governing board.—A commission consisting of three members of the Royal Agricultural Society of the Province of Hanover: Jahns, *Göttingen;* Beseler, *Weende;* Prof. F. Lehmann, *Göttingen.*

Station staff.—Prof. F. Lehmann, *Dir.;* Doctors Krüger, Haas, Haners, and Kantelberg, *Assts.*

Origin.—Established at Celle in 1852 by the Royal Agricultural Society of Hanover; removed to Weende in 1857 and placed in charge of W. Henneberg; removed to Göttingen in 1874.

Equipment.—Half of the first story of the main building of the Agricultural Institute, with laboratories, stables for cattle, sheep, and swine, Pettenkofer respiration apparatus.

Income.—For 1903, $3,094 from the State.

Lines of work.—Experiments in animal nutrition, especially feeding and digestion experiments with milch cows and fattening sheep. Henneberg's work at Weende in studying the laws of the nutrition of ruminants is classic, and forms the basis of our present knowledge of the subject. The Weende methods of fodder analysis is another important contribution to science.

Experiment Field of the University, Göttingen.

Governing board.—Curator of the university.

Station staff.—Prof. C. von Seelhorst, *Dir.;* W. Freckmann and Dr. Muther, *Assts.*

Origin.—Founded in 1872 by the State; made independent of the Agricultural Institute in 1896.

Equipment.—Experiment field of about 15 acres; vegetation house with workroom and capacity for about 600 pots on movable trucks, and chemical laboratory.

Income.—For 1901, not including salaries, $1,800 from the Department of Public Instruction.

Lines of work.—Field experiments with forage plants, cereals, potatoes, sugar beets, and other field crops to determine fertilizer requirements, methods of culture, etc.; pot experiments to supplement the field trials; breeding of cereals and laboratory investigations, including the chemical analysis of crops, soils, fertilizers, etc., and considerable original research work.

Control Station for Fertilizers, Feeding Stuffs, and Seeds, Göttingen.

Governing board.—The president and the secretary of the General Agricultural Society of Göttingen; Jahns, *Göttingen*; Dr. Frhr. Grote, *Jühnde;* director of the Agricultural Institute of Göttingen; Prof. W. Fleischmann, *Göttingen*; two members appointed by the magistrate of Göttingen, and the director.

Station staff.—Dr. G. Kalb, *Dir.;* K. Ehrenstein, *Asst.*

Origin.—Founded in 1876 by the General Agricultural Society of Göttingen.

Equipment.—A laboratory building, erected in 1896 at a cost of about $5,000, which contains four well-equipped laboratories, a room for seed testing, and a stable for experiments in animal nutrition.

Income.—For 1903, $1,642.20 (societies, $214.20; fees, $1,428).

Lines of work.—Analysis and investigation of fertilizers, feeding stuffs, seeds, and foods.

Dairy Laboratory of the Central Cooperative Dairy, Güstrow, Mecklenburg-Schwerin.

Governing board.—Count von Bassewitz, director of the Central Cooperative Dairy.

Station staff.—Johs. Siedel, *Dir.;* Doctor Hesse, *Asst.*

Origin.—Founded in 1898.

Income.—For 1902, $1,428 from the State.

Lines of work.—Dairy investigations.

I. Agricultural Chemical Experiment Station, Halle-on-the-Saale.

Station staff.—Dr. W. Schneidewind, *Dir.;* Dr. W. Krüger, *V.-Dir.:* Drs. D. Meyer, H. Frese, and B. Heinze, *Assts.*

(1) Agricultural Chemical Division.

(2) Bacteriological Division, Dr. W. Krüger, *Chief.*

(3) Experiment Farm, Lauchstädt, W. Gröbler, *Supt.*

(4) Vegetation Station, Lauchstädt.

(5) Bacteriological Experiment Field.

Origin.—Founded in 1855 on a farm at Gross-Gmehlen; removed to Salzmünde in 1859, and again to Halle in 1865. In 1890 a branch vegetation station was established in the suburbs of the city, and in 1896 a branch station for field experiments and cattle feeding was established at Lauchstädt, 8 miles southwest of Halle. In 1901 the vegetation station was removed from Halle to Lauchstädt.

Equipment.—Chemical and bacteriological laboratories at Halle; vegetation house, workroom, storeroom, farm buildings, and an experiment field of about 134 acres at Lauchstädt.

Income.—For 1903, $11,543 (Ministry of Agriculture, $2,856; board of agriculture, $1,666; German Agricultural Society, $952; soil investigations, $476; for the experiment field, from the Ministry of Agriculture, $4,760; for the vegetation station, from the Ministry of Agriculture, $476; for the bacteriological field, from the Ministry of Agriculture, $357).

Lines of work.—Chemical and bacteriological investigations, pot and field experiments in plant nutrition, and to test fertilizers and varieties of field crops, feeding experiments, and experiments with barnyard manures and green manures.

II. Agricultural Chemical Control Station, Halle-on-the-Saale.

Station staff.—Dr. H. C. Müller, *Dir.;* Dr. W. Naumann, *V.-Dir.;* Doctors Schuman, Wege, Schultze, Bieler, Teller, Engineer Zachart, and Miss Herrmann, *Assts.*

(1) Agricultural Chemical Investigation Station.

(2) Botanical Investigation Station, Dr. H. Steffeck, *Chief.*

Equipment.—Chemical and botanical laboratories and an experimental garden.

Income.—For 1903, $22,134 (State, $476; provincial government, $714; analyses, $1,904; fertilizer, food, milk, and seed control, $19,040).

Lines of work.—Analytical and control work, in addition to botanical and chemical investigations with fertilizers, feeding stuffs, foods, condiments, dairy products, and seeds.

Experiment Station for Plant Diseases, Halle-on-the-Saale.

Governing board.—Prof. J. Kühn, *Halle;* Dr. L. Kuntze, *Delitzsch;* Dr. O. Rabe, G. Wesche, *Raunitz.*

Station staff.—Prof. M. Hollrung, *Dir.;* P. Bruno, *Asst.;* two clerks; one helper.

Origin.—Founded in 1889, and in 1897 brought under the control of the Chamber of Agriculture of the Province of Saxony.

Equipment.—The station has quarters in the new Chamber of Agriculture building, including a chemical and a mycological laboratory, one room for the director, one for the library, and one for the assistant, an office, a large room for collections, and two storerooms. There is also a glasshouse with hot and cold rooms, an experiment garden, and 25 outdoor plats with cement walls.

Income.—For 1903, $3,712.80 (State, $1,309; Chamber of Agriculture, $952; Society of German Sugar Industry, $1,380.40; fees, $71.40).

Lines of work.—Study of plant diseases and experiments in combating diseases and enemies of cultivated plants, especially of sugar beets.

Physiological Laboratory, Experiment Field, and Park for Domestic Animals of the Agricultural Institute of the University, Halle-on-the-Saale.

Station staff.—Prof. J. Kühn, *Dir.;* Professor Fischer, *Chief Div. of Dairying;* Professor Disselhorst, *Vet. Clinic;* Professor Nachtweh, *Mach. Lab.;* Prof. G. Baumert, *Chief Expt. Lab.;* Dr. P. Holdefleiss, *in charge of collections;* Doctor Buhlert, *Lab. Asst.;* Doctor Bode, *Asst. Chem.;* W. Staudinger, *Asst. Physiol. Lab.;* Schönemann, *Expt.;* R. Mentzel, *Admin. of Expt. Field and Park for Domestic Animals;* Grüssner, *Overseer of Park for Domestic Animals;* Fülberth, *Form. of Expt. Field.*

Origin.—Founded in 1863 in connection with the Agricultural Institute of the University of Halle.

Equipment.—Experiment fields, park, agricultural and physiological laboratories, vegetation house, and the laboratories of the institute.

Income.—For 1902, a subsidy of $285.60 and other necessary funds from the Agricultural Institute.

Lines of work.—Investigations in animal and plant nutrition and diseases, including methods of culture, sugar-beet diseases and culture, and green manuring; determination of feeding standards; cattle breeding and experiments to determine losses of nitrogen in manures.

Agricultural Botanic Experiment Station, Hamburg.

Governing board.—Committee of the Chamber of Agriculture.

Station staff.—Dr. Oscar Burchard, *Dir.*

Origin.—Organized in 1891, and in 1897 brought under the control of the Schleswig-Holstein Chamber of Agriculture.

Equipment.—Laboratory containing special apparatus for testing seeds and flours, and experiment fields.

Income.—For 1902, $714 (Chamber of Agriculture, $178.50; fees, $535.50).

Lines of work.—Vegetation and tillage experiments; seed testing; microscopic investigation of feeding stuffs, botanical articles of commerce, etc.

Botanic Museum and Laboratory for Commercial Products, Hamburg.

Station staff.—Prof. E. Zacharias, *Dir.*

The museum includes two divisions devoted to the investigation of commercial seeds and plants: (1) Division for seed control, founded in 1891, Dr. A. Voigt, *Dir.;* income for 1903, $1,142.40. (2) Division for plant protection, founded by the State in 1898, Dr. C. Brick, *Dir.;* income for 1903, $5,950. This division controls the importation of live plants from foreign countries, investigates means of repression in the case of outbreaks of plant diseases, and exercises control over the grape nurseries, vineyards, and orchards in the region.

Agricultural Experiment Station for the Study of Plant Growth, Hamburg-Horn.

Station staff.—Dr. M. Ullmann, *Dir. and Agr.;* Drs. Bischkopf, Rademacher, and Wiengreen, *Chem.;* Dr. H. Schmidt, *Asst. Chem.;* two laboratory helpers, one gardener in the experimental work, two stewards, twelve agricultural students.

Origin.—Founded by the Society of German Fertilizer Manufacturers.

Lines of work.—Investigations in plant growth, especially of various commercial fertilizers in their effect upon field crops and meadows.

Dairy Experiment Station, Hameln, Prussia.

Governing board.—The council of the Chamber of Agriculture for the Province of Hanover.

Station staff.—Prof. P. Vieth, *Dir.;* two assistants, one clerk.

Origin.—Founded in 1893 by the Royal Agricultural Society of Celle. The station is connected with the Dairy Institute of Hameln, which comprises also a dairy school and a bureau of information.

Equipment.—Two laboratories equipped with apparatus for analyzing milk and dairy products.

Income.—For the Dairy Institute for 1902, $4,522 (State, $2,975; Chamber of Agriculture, $476; fees, $1,071).

Lines of work.—Investigation of dairy problems; examination of dairy machinery, especially cream separators; determination of butter fat, etc., for dairies and for private persons.

Agricultural Experiment Station, Hildesheim, Prussia.

Governing board.—Board of directors of the Chamber of Agriculture for the Province of Hanover.

Station staff.—Dr. Carl Aumann, *Dir.;* Doctors Wehner, R. Reinmann, Günther, A. Hensen, and Engineer Gutmann, *Assts.*

Origin.—Founded in 1870 by the General Agricultural and Forestry Society of Hildesheim; from 1878 to 1899 under the Royal Agricultural Society of Celle; since then under the Chamber of Agriculture for the Province of Hanover.

Equipment.—Laboratory building.

Income.—For 1903, $10,234 (State, $1,071; fees for analyses, $9,163).

Lines of work.—Analysis and control of fertilizers, feeding stuffs, and seeds; experiments in agricultural technology and fertilizers. The station is a public institution for the investigation of foods and condiments.

Experiment Stations of the Agricultural High School, Hohenheim, Württemberg.

Governing board.—Under the control of the Ministry of Religion and Public Instruction.

Station staff.—Dr. E. V. Strebel, *Dir. of Agr. High School.*

Agricultural Chemical Station: Prof. A. Morgen, *Dir.;* Prof. Herman Sieglin, *V.-Dir. and Agr.;* Dr. W. Zielstorff, C. Beger, G. Fingerling, Westhausser, and Huss, *Chems.;* Doctor Lossen, *Asst. in Chem.;* W. Starz, *Sten.;* four helpers.

Botanical Institute: Prof. O. Kirchner, *Dir.;* Dr. J. Michalowski, *Asst. Seed Testing;* Drs. K. Braun and O. Dickel, *Assts. Veg. Path.*

Station for Testing Agricultural Implements: Prof. Carl Fruwirth, *Dir.*

Institute of Technology: ——— ———, *Dir.;* Drs. A. Klaiber and Pulvermüller, *Assts. Chem.;* Dr. A. Ebertz, *Asst. Physiol.;* Schaller, *Asst. Brew.*

Origin.—The Agricultural High School was founded in 1847; the Agricultural Chemical Station, in 1865; the Seed Testing Station, in 1877; Station for Testing Agricultural Implements, in 1883; experiments in dairying, fermentations, fish culture, etc., in connection with the Institute of Technology, from 1891 to 1894.

Equipment.—The station building, erected in 1899 at a cost of $35,700, contains 11 laboratories, storerooms, and apartments for the

director and his servant. The old building contains 2 workrooms and apartments for 3 chemists. There are also technological laboratories, stables containing feeding stalls, dairy buildings, an experimental brewery, an implement hall, a glass vegetation house containing tracks and 18 cars in which some 400 zinc pots used in vegetation experiments are moved about, a lysimeter, experiment fields covering 18 acres, reservoirs; meteorological and other apparatus, etc.

Income.—For 1900: Agricultural Chemical Station, $6,223.70 from the State; Seed Testing Station, $1,400.

Lines of work.—The work of the Agricultural Chemical Station includes pot and field experiments in plant growth and plant nutrition, experiments in animal nutrition, anaylsis and control of fertilizers and feeding stuffs, investigation of diseases of plants and animals, investigation of soils; the Seed Testing Station—test and control of seeds, variety tests, etc.; the Station for Testing Agricultural Implements—dynamometric and other tests of harvesters, mowing machines, and all kinds of farm machinery and implements; Institute of Technology—investigation of milk and dairy products, growing of pure cultures of yeasts, and investigations in wine production and in the breeding of fish, poultry, and farm animals.

Agricultural Experiment Station, Insterburg, Prussia.

Governing board.—Committee appointed by the Provincial Agricultural Central Society.

Station staff.—Dr. W. Hoffmeister, *Dir.;* Dr. R. Braun and Miss Schulemann, *Assts.*

Origin.—Founded in 1858 by the Agricultural Central Society of Lithuania and Mazura.

Income.—For 1903, $4,046 (State, $1,071; province, $238; Agricultural Central Society, $285.60; fees, $2,451.40).

Lines of work.—Investigations in plant physiology; control of fertilizers, seeds, foods, and condiments.

Agricultural Experiment and Control Station of the University, Jena, Saxe-Weimar.

Station staff.—I. Division of Chemistry: Prof. H. Immendorff, *Chief;* Dr. O. Lemmermann, E. Eldau, M. Zapfe, Miss M. Densov, and H. Mentz, *Assts.;* three helpers. II. Division of Agriculture: Professor Edler, *Chief;* Sprenger, *Asst.* III. Division of Animal Physiology: Doctor Klee, *Chief;* Promnitz, *Asst.*

Origin.—Founded in 1861 by the State.

Equipment.—The station makes use of the institute laboratories and an experiment field of 4½ acres.

Income.—For 1903, about $4,522 ($1,428 from Weimar, Altenburg, Weiningen, and Schwarzburg-Sondershausen; receipts from experiments and control work about $3,094).

Lines of work.—Experiments in plant and animal nutrition; investigation of fertilizers, feeding stuffs, and foods; seed control.

District Agricultural Field and Experiment Station, Kaiserlautern, Bavaria.

Governing board.—Agricultural Committee of the Palatinate.

Station staff.—Doctor Prove, *Dir.;* Dr. Blanck, *Asst.*

Origin.—Founded in 1894 by the president of the Palatinate.

Equipment.—Laboratory, experiment field containing nearly 41 acres, farmyard, and stables.

Income.—For 1903, $2,380 from the agricultural committee.

Lines of work.—Field and fertilizer experiments; investigation of fertilizer production and conservation, and of dairy products.

Agricultural Chemical Experiment Station, Kempen-on-the-Rhine, Prussia.

Governing board.—A committee of the Rhine Province Farmers' Society, L. Bönniger (*Chair.*), *Schmolbovich.*

Station staff.—Dr. Gottfr. Fassbender, *Dir.;* Jos. Kern, M. Juncker, Dr. A. Y. Grevillius, H. Deegener, Fr. Baier, *Assts.;* two laboratory assistants; three clerks; two helpers.

Origin.—Founded in 1883 by the Rhine Province Farmers' Society.

Equipment.—Chemical laboratory and dairy laboratory, the latter erected in 1896.

Income.—For 1903, $11,454.94 (province, $714; fees, $10,707.38; miscellaneous, $33.56).

Lines of work.—Investigation of farm products, fertilizers, feeding stuffs, seeds, etc.; control of fertilizers, feeding stuffs, and seeds; and dairy investigations.

Agricultural Experiment Station of the Ministry of Agriculture of the Province of Schleswig-Holstein, Kiel, Prussia.

This station was founded in 1870 by the Schleswig-Holstein Agricultural Central Society, and reorganized and broadened in 1877 to include three divisions, each with an independent staff. For the support of these divisions the State makes annual appropriations, but each division also receives fees for analyses.

Agricultural Chemical Division.

Station staff.—Prof. A. Emmerling, *Dir.;* Dr. H. Wehnert, *V.-Dir.;* Drs. H. Hossbach, W. Möller, F. Doepmann, and F. Sieden, *Assts.*

Equipment.—A chemical laboratory containing apparatus for experimental and control work.

Income.—For 1902–3, $7,140 (State, $714; fees, $6,426).

Lines of work.—Field experiments, investigations in plant growth and agricultural chemistry, analysis and control of fertilizers and feeding stuffs.

Dairy Division

Station staff.—Prof. H. Weigmann, *Dir.;* Dr. H. Höft, *Chief Dairy Expts.;* Drs. Franz Lauterwald and Gruber, *Chem. Bact.;* Doctors Burr and Bartsch, *Dairy Assts.;* O. Lindemann, *Form. of Dairy.*

Equipment.—Two laboratories, one a modern dairy building with cheese rooms; experiment barn for 10 cows. The station uses about 6,000 pounds of milk per day.

Income.—For 1902–3, $8,449 (State, $3,094; province, $2,380; fees, $2,975).

Lines of work.—The work of the dairy division is divided into two parts: (1) Chemical and bacteriological investigations, (2) investigations and control of dairy products and instruction in dairying.

Feeding Stuffs Division.

Station staff.—Dr. C. Reese, *Dir.;* Dr. G. Ritzmann, *V.-Dir.;* Doctors Iggeno, Isernhagen, and R. Fresenius and H. Spies, *Assts.*

Income.—For 1902–3, fees for analyses amounting to $6,354.60.

Lines of work.—Investigation of feeding stuffs for the chiefs of police in the province, except in Altona, and for other officers and private citizens.

Seed Control Station, Kiel.

The station is a private institution, under the control of Prof. H. Rodewald, director of the Agricultural Institute of Christian-Albrecht's University, who is also director of the station, and makes use of the apparatus of the institute. He is the inventor of the well-known Rodewald apparatus for testing seed germination.

Income.—For 1903, an annual subsidy of $71.40 from the Chamber of Agriculture, and fees amounting to about $1,200 annually.

Lines of work.—Testing and control of seeds.

Dairy Experiment Station and Institute, Kleinhof-Tapiau, Prussia.

Governing board.—Glüer, *Gergehnen;* Doctor Böhme, *Königsberg;* Doctor Tolkiehn, *Insterburg;* Hippel *Gross Kuglack;* Prof. Frdr. Albert, *Königsberg;* Dr. K. Hittcher.

Station staff.—Dr. K. Hittcher, *Dir.;* Franz Prylewski, *Chem.;* Franz Rusche, *Chem.;* J. Gosch, *Dairyman.*

Origin.—Founded May 1, 1887, by the Ministry of Agriculture of East Prussia and the three agricultural central societies of Lithuania

and East and West Prussia, as an experimental dairy, and reorganized January 1, 1893, as a dairy experiment station.

Equipment.—The station possesses a modern dairy laboratory, provided with electric lights and motors for running the dairy apparatus. It is located on the royal domain, the keeper of which, Herr Amtsrath Schrewe, has placed his dairy herd of about 1,700 cows at the disposal of the station for experimental purposes.

Income.—The station is mainly self-supporting, but receives aid from the State, the Province of East Prussia, and the agricultural corporations of East and West Prussia.

Lines of work.—Practical and experimental investigation of dairy problems, including feeding experiments with dairy cows; experiments in making and curing cheese; tests of strainers, separators, and other dairy apparatus; laboratory investigations with pure cultures, etc.

Agricultural Experiment Station, Königsberg, Prussia.

Governing board.—Reich, *Meyken;* Professor Ritthausen; Kühn, *Kornieten;* Kreiss, *Königsberg;* Magnus, *Holstein.*

Station staff.—Prof. G. Klien, *Dir. and Chem.;* Drs. A. Köhler, Alfred Lemcke, Röckner, Salkovski, and J. Frost, *Assts.*

Origin.—Founded in 1875 by the East Prussian Agricultural Central Society.

Income.—For 1903, $7,378 (State $1,190; province, $476; fees, $5,712).

Lines of work.—Scientific investigations and control of fertilizers, feeding stuffs, and seeds.

Dairy Laboratory of the University Agricultural Institute, Königsberg.

Governing board.—Under the control of the Ministry of Agriculture.

Station staff.—Prof. Frdr. Albert, *Dir.;* Dr. Reisch, *Asst.*

Origin.—Founded in 1887. The laboratory supplements the work of the dairy station at Kleinhof-Tapiau.

Equipment.—Laboratory of the Agricultural Institute. Milk is procured from a dairy at Quadnau.

Income.—For 1900, $238.

Lines of work.—Experiments in animal physiology and dairying.

Agricultural Chemical Laboratory of the University, Königsberg.

Staff.—Prof. A. Stutzer, *Dir.;* Doctors Sambraus and Wangnik, *Assts.*

Origin.—Established in 1874.

Equipment.—An experiment field of about 4 acres and a vegetation station.

Lines of work.—Investigations of plant nutrition and bacteriology.

Division of Plant Pathology of the University Agricultural Institute, Königsberg.

Staff.—Prof. E. Gutzeit, *Dir.*

Equipment.—Experiment field of about 10 acres.

Division of Plant Production of the University Agricultural Institute, Königsberg.

Staff.—Prof. H. Buhlert, *Dir.;* Doctor Holldack and Knorr, *Assts.*

Equipment.—Agricultural physiological laboratory in connection with an agricultural-botanical garden of 1½ acres and an arboretum of 108 acres.

Lines of work.—Cultural and variety experiments under local conditions.

Agricultural Chemical Experiment and Seed Control Station, Köslin, Prussia.

Governing board.—Principal of board of directors of the Pomeranian Economic Society.

Station staff.—Dr. P. Baessler, *Dir.;* Doctors Brehmer, Volkholz, Krische, and Harnoth, *Assts.;* one clerk.

Origin.—Founded in 1863 by the Pomeranian Economic Society for Plant Physiology and Soil Problems at Regenwalde; removed to Köslin in 1893. In 1898 a department for moor culture was added.

Income.—For 1903, $9,734.20 (State, $1,594.60; province, $285.60; agricultural ministry, $714; fees, $7,140).

Lines of work.—Experiments in plant nutrition, moor culture, and with soils in general.

Agricultural Institute of the University, Leipzig, Saxony.

Governing board.—Under control of the University of Leipzig.

Station staff.—Prof. Wilhelm Kirchner, *Dir. and Agr.;* Prof. F. Falke, *Plant and Animal Breeding;* Prof. W. Strecker, *Agrotechny;* Prof. W. Eber, *Vet.;* Dr. E. S. Zürn, *Hort.;* other assistants and helpers.

Origin.—Founded in 1869.

Equipment.—Laboratories; breeding stables for cattle, sheep, and swine; well-equipped dairy building; plant house and garden; experimental field of 60 acres. A new institute building will be occupied this year.

Income.—For 1902, $20,122.90 (State, $16,764.72; fees, etc., $3,358.18).

Lines of work.—In addition to the demonstration work in connection with agricultural instruction, various members of the staff engage more or less in the investigation of problems in plant breeding, vegetable physiology and pathology, animal production, testing of agricul-

tural implements and machinery, and the study of diseases of poultry, sheep, cattle, and swine. The director is author of the Handbook on Dairying, and the veterinarian has made notable investigations on chicken cholera, diphtheria in poultry, tuberculosis, influence of formaldehyde on animal diseases, prevention of diseases by use of acid litter, etc.

Agricultural Experiment Station, Marburg, Prussia.

Governing board.—Chamber of Agriculture of the District of Cassel.

Station staff.—Dr. E. Haselhoff, *Dir.;* Drs. A. Hebebrand, F. Mach, *Chiefs of Div.;* Drs. Fr. Gössel, Ad. Fingerling, P. Waldschmidt, G. Mangler, W. Gäbel, Luecke, O. Engels, *Assts. Chem;* H. Kraut, *Asst. Bot. and Sec.;* helpers and clerks.

Origin.—Founded by the Chamber of Agriculture of the District of Cassell in 1857, at Altmorschen; removed to Marburg in 1880.

Equipment.—Laboratory containing apparatus for chemical, bacteriological, and physical experiments; and a glass vegetation house.

Income.—For 1903, $13,315 (State, $4,141; Ministry of Agriculture, $1,547; communal government, $928; fees, $6,699).

Lines of work.—Vegetation experiments in pots to determine the fertilizer needs of Hessian soils; investigation of rock disintegration in Hesse; soil bacteriology; experiments to determine the relation of bacteria to plant growth; official investigation of foods and water for the District of Cassel, and of milk for dairies; control of fertilizers, feeding stuffs, and seeds; training of food chemists.

Royal Agricultural Experiment Station, Möckern, Saxony.

Governing board.—One trustee appointed by the Economic Society of Leipzig and three by the Minister of the Interior; and the director.

Station staff.—Prof. O. Kellner, *Dir.;* Prof. O. Böttcher, *V.-Dir.;* Prof. J. Hazard, *Agron.;* Dr. F. Barnstein, *Bot.;* Dr. A. Köhler, *Lab. Dir.;* seven assistant chemists.

Origin.—Founded in 1851 by the Economic Society of Leipzig upon its estate in Möckern; brought under the control of the State in 1879.

Equipment.—Four well-equipped laboratories; a vegetation house containing 500 vegetation pots, stable for experiments in animal nutrition, Pettenkofer respiration apparatus, Berthelot calorimeter; an experiment farm.

Income.—In 1903, $14,839.30 (State, $11,019.40; endowment, $595; fees, $2,975; miscellaneous, $249.90).

Lines of work.—Feeding, breeding, and respiration experiments with domestic animals; vegetation experiments; analysis of soils, fertilizers, and feeding stuffs; practical investigations for farmers; cooperative experiments; studies in plant nutrition.

Central Agricultural Experiment Station, Munich, Bavaria.

Governing board.—The director and the principal of the agricultural division of the Royal Technical High School; the director of the experiment station; the general secretary of agricultural societies in Bavaria; three members appointed by the minister of education; eight farmers.

Station staff.—Prof. Franz v. Soxhlet, *Dir.;* Dr. A. Scheibe, *Asst.;* four other assistants; one feeding master; one housekeeper.

Origin.—Founded in 1857 by the general committee of the agricultural societies in Bavaria for animal and plant physiology; reorganized in 1869; since 1872 a State institution connected with the Royal Technical High School.

Equipment.—In the autumn of 1899, at a cost of $41,650, a laboratory building was completed which contains four large laboratories, three balance rooms, six small workrooms, three offices, two libraries, machine room equipped with electric motor power, experimental stalls, electric lighting, steam heating, and other modern improvements. Two rooms for seed testing are in an old building.

Income.—For 1903, $7,068.60 (State, $4,926.60; fees, $2,142).

Lines of work.—Investigations in animal and plant physiology, and control of fertilizers, feeding stuffs, and seeds.

Agricultural Physiological Laboratory and Experiment Field, Munich.

Governing board.—Under the control of the Royal Technical High School in Munich.

Station staff.—Prof. C. Kraus, *Dir.;* H. Metzner, *Asst.*

Origin.—Founded in 1875 in connection with the Royal Technical High School.

Equipment.—Laboratory and experiment field.

Income.—For 1902, $476 (exclusive of salaries, heating, etc.) from the State.

Lines of work.—Investigations in agricultural physics and physiology.

Station for Scientific Brewing, Munich.

Governing board.—Committee of the Society of Brewers.

Station staff.—Prof. C. J. Lintner, *Dir.;* Dr. J. Brand, *V.-Dir.;* Dr. H. Will, *Chief Div. of Physiol.;* Dr. W. Schwackhöfer, *Tech. Official for Business Revision.*

Origin.—Founded in 1874 as the Laboratory for Brewing; reorganized the same year under the management of the Society of Brewers.

Income.—For 1903, $14,994 (contributions from members of the Society of Brewers, $9,044; fees, $5,950).

Lines of work.—Chemical analyses, constructing and testing new apparatus and instruments used in scientific investigations for brewers, experiments in the brewing of beer.

Agricultural Botanic Institute, Munich.

Governing board.—Council consisting of representatives of both divisions of the Royal Bavarian Ministry of State; the director of the Central Agricultural Experiment Station of Munich; principal of the Moor Culture Institute; director of the Seed Laboratory of the Royal Academy of Agriculture and Brewing, Weihenstephan; four farmers appointed by the Bavarian Agricultural Council and four appointed by the Royal Ministry of State of the Interior.

Station staff.—Dr. Lorenz Hiltner, *Dir.*; four assistants, and a servant.

Origin.—Organized October 1, 1902.

Equipment.—An experiment field.

Income.—Five thousand eight hundred and thirty-one dollars per annum from the State.

Lines of work.—Improvement of methods of plant production; botanical experiments; cultural, fertilizer, and plant-breeding experiments; study and investigation of the bacteria of soils, foods, and fertilizers, etc.; combating diseases and insect enemies injurious to plants; examination of seeds; botanical, microscopic, and bacteriological investigations of feeding stuffs, and the instruction of farmers by means of practical demonstrations, lectures, and publications.

Moor Culture Institute, Munich.

Staff.—Dr. Anton Baumann, *Dir.*

Origin.—Established January 1, 1895, by the Division of Agriculture and Commerce of the Ministry of the Interior.

Equipment.—Two office rooms, a chemical laboratory, and six workrooms provided by the Division of Agriculture and Commerce of the Ministry of the Interior.

Income.—The institute has been aided financially by the Ministry of Finance, the Government of Swabia, the Bavarian Agricultural Council, the German Agricultural Society, and individuals.

Lines of work.—By means of numerous experiment fields in different parts of Bavaria the institute is conducting investigations for the improvement of moorlands, including drainage, fertilizer, and cultural experiments, the latter principally with cereals, potatoes, and beets; destruction of weeds, and meteorological investigations. Four of these experiment fields have in recent years become moor culture stations, viz, at Karlshuld (Th. Mayer), at Puchheim (Dr. Eugene Gully), at Bernau (Dr. A. Baumann), and at Erding (J. A. Hensele).

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Agricultural Experiment Station, Münster, Prussia.

Governing board.—Von Laer; L. Waldeyer, *Driburg;* Upmeyer, *Borgholzhausen;* C. Herold, *Loevelinkloe;* Doctor Schulz, *Soest;* Von Vogelsang, *Eckendorf;* Doctor Schleh, *Münster;* Prof. J. König.

Station staff.—Prof. J. König, *Dir.;* Dr. A. Boemer, *V.-Dir., and Chief Div. of Fert., Soils, and Feeding Stuffs;* Dr. A. Spieckermann, *Chief Div. of Pract. Work;* Doctors Hasenbäumer, Mayer, Behre, Scholl, Matz, Tillmans, Hurdelbrink, Lemcke, Wagener, A. Palmer, and P. Schreiber, *Assts.;* five laboratory helpers.

Origin.—Founded in 1871 by the Agricultural Provincial Society of Westphalia and Lippe.

Equipment.—Large and well-equipped laboratory, vegetation house, director's dwelling, and five or six dwellings for employees, outbuildings for storage and preparation of materials, masonry lysimeter, and complete apparatus for meterological observations.

Income.—For 1903, $22,538.60 (State, $3,284.40; provincial government, $3,165.40; Chamber of Agriculture, $952; fertilizer and feeding stuffs control, $166.60; fees, $14,970.20).

Lines of work.—Scientific investigations in plant nutrition, relation of nitrogen to plant growth, and the effects of sewage from factories; control of fertilizers, feeding stuffs, soils, and manures, and meteorological observations.

Experiment and Control Station, Oldenburg-on-the-Main.

Station staff.—Prof. P. Petersen, *Dir.;* H. Holdmeier, V. Eisner, E. Möller, *Assts.;* H. Vollers, *Expert;* A. Kirsten, *Chief Dairy Div.*

Origin.—Founded in 1876 by the Oldenburg Agricultural Society.

Income.—For 1903, $6,341.50, fees.

Lines of work.—Control of fertilizers, feeding stuffs, and seeds; and agricultural experiments.

Experiment Station for Upper Lusatia, Pommritz, Saxony.

Governing board.—Three representatives of the constitutional estates, two of the district agricultural society, one of Upper Lusatia, one government commissioner, and the director of the station.

Station staff.—Prof. G. Loges, *Dir.;* Drs. K. Mühle, A. Schüler, P. Schönherr, *Assts.;* two laboratory assistants; one clerk.

Origin.—Established in 1857 at Weidlitz; removed in 1864 to a site purchased at Pommritz.

Equipment.—Stables, laboratory, and experiment field.

Income.—For 1903, $6,640.20 (State, $1,428; constitutional estates, $1,666; Bautzen district society, $214.20; fees, $3,094; miscellaneous, $238).

Lines of work.—Field and stall experiments in animal nutrition; field and laboratory experiments with plants and fertilizers; dairy and soil investigations; control of fertilizers and feeding stuffs.

Agricultural Experiment Station, Posen-Jersitz, Prussia.

Governing board.—Trustees appointed by the minister of agriculture of the Province of Posen.

Station staff.—Dr. M. Gerlach, *Dir.;* Doctor Krenz, *Asst. Dir.;* Doctor Jungner, *Bot.;* Doctor Vogel, *Bact.;* Doctors Werner, Knoetsch, Densch, Ihle, Obarski, and Schäfer, *Assts.*

Origin.—Founded in 1877 by combining the experiment stations at Kuschen (founded in 1861) and Bromberg (founded in 1873).

Income.—For 1902, $13,066.20 (Ministry of Agriculture, $2,713.20; provincial assembly, $357; provincial ministry of agriculture, $952; fees, $9,044).

Lines of work.—Investigations in animal nutrition, plant growth, and industries related to agriculture; control of fertilizers, feeding stuffs, and seeds.

Dairy Institute, Proskau, Prussia.

Governing board.—Gerlach, *Oppeln;* Dr. V. Kutzleb, *Breslau;* Von Teichman and Logischen, *Dombrowski;* Wichelhaus, *Niewodnik;* and the director.

Station staff.—Dr. J. Klein, *Dir.;* Drs. H. Purfürst, Emanuel Kröner, *Assts.*

Origin.—Founded in 1878 by the Central Agricultural Society of Silesia.

Equipment.—Laboratory building and fully equipped dairy, in which from 500 to 600 pounds of milk are daily manufactured into butter and cheese.

Income.—For 1903, $2,760.80 (State, $1,356.60; provincial assembly, $1,404.20).

Lines of work.—Practical and experimental work in dairying and cheese making; lectures to the public and to societies on dairy subjects.

Experiment Station for Plant Physiology, Proskau.

Governing board.—Connected with the Royal Pomological Institute at Proskau and under the same management.

Station staff.—Prof. R. Stoll, *Dir.;* Dr. Richard Ewert, *Chief Div. Bot.;* Dr. R. Otto, *Chief Div. Chem.;* Doctor von Oven, *Asst. Bot.;* Dr. B. Tolmacz, *Asst. Chem.*

Origin.—Founded in 1873 by the State.

Income.—Five hundred and eleven dollars and seventy cents from the State, also various sums for the library and sundry expenditures from the Pomological Institute.

Lines of work.—Chemical and physiological investigations, especially with fruit trees, garden plants and their diseases.

Experiment Station, Rostock, Mecklenburg-Schwerin.

Governing board.—Baron von Maltzan (*Chair.*), *Maltzow;* Nölting (*Pres. of the Patriotic Society*), *Spriehnsen;* Professor Geinitz, *Rostock;* Von der Sode, *Frauenmark;* Rettich, *Rostock;* Von Müller, *Gr. Lunow;* and the director of the station.

Station staff.—Prof. R. Heinrich, *Dir.;* Dr. H. Göttsch, F. von Interzenka-Morgenstern, E. Fränkel, and C. Beer, *Assts. in Control Div.;* Dr. M. Dude and M. Pollock, *Assts. in Sci. Div.;* Dr. H. Zimmermann, *Plant Protection;* F. Krüger, *Methods of Culture;* one secretary, two helpers, one gardener, field master, and feeding master.

Origin.—Founded in 1875 through the cooperation of the Government and the Patriotic Society.

Equipment.—Vegetation house, two farm buildings containing experiment stalls, and a 15-acre experiment field.

Income.—For 1903, $12,376 (State, $4,998; Agricultural Society, $559.30; fees, $6,461.70; miscellaneous, $357).

Lines of work.—Plant physiology; feeding experiments; cultural experiments; control of fertilizers, feeding stuffs, and seeds.

Flax Culture Station of the Royal Prussian Department of Commerce, Sorau, Württemberg.

Alois Herzog, *Dir. and Chem.*
Established in 1900.

Agricultural Experiment Station, Speyer, Bavaria.

Governing board.—The district agricultural committee of the palatinate.

Station staff.—Prof. A. Halenke, *Dir.;* Drs. Max Kling, Simon, and Engels, *Assts. in Agr. Div.;* Drs. O. Krug, Müller, and Theo. Schmidt, *Assts. in Food Div.*

Origin.—The station includes two divisions: (1) The agricultural division, which was established in 1875 by the district committee of agriculture of the palatinate, and (2) the division of foods and condiments, established in 1884 by the State.

Equipment.—Laboratories recently erected.

Income.—For 1903, $8,568 (district, $1,356.60; fertilizer factories, $1,213.80; State, $476; city and rural communities, $1,999.20; its own receipts, $2,618; agricultural society, $904.40).

Lines of work.—Investigation and control of fertilizers, feeding stuffs, and seeds; experiments in plant physiology; testing of foods and condiments; expert testimony for the Government; itinerant food control.

Station for Plant Physiology and Seed Control, Tharand, Saxony.

Governing board.—One government representative and eight members who represent: The Royal Saxony Agricultural Commission, District Agricultural Society of Dresden, Tharand Forestry Academy, horticulture, and the Tharand and Dresden stations themselves, which are under the same governing board.

Station staff.—Dr. F. Nobbe,[a] *Dir.;* Dr. Jos. Simon, *Plant Physiol.;* Drs. L. Richter and A. Muth, *Chem.;* K. Gebhardt, *Gard. Form.;* G. Vette, *Clerk;* one laboratory helper.

Origin.—Organized in 1869 by the Dresden District Agricultural Society; brought under State control in 1875; division of gardening added in 1886. When the Experiment Station for Plant Culture at Dresden was organized in 1890, both stations were placed under the same governing board.

Equipment.—Chemical and physiological laboratories, vegetation house equipped for water-culture experiments, complete apparatus for seed testing, a large collection of preserved seeds, and a small experimental garden.

Income.—For 1903, $4,224.50 (State $3,439.10; Dresden District Agricultural Society, $71.40; fees, $714).

Lines of work.—This station was the first to exercise seed control, a line of work which has been conducted at Tharand for more than thirty years. The station is also noted for the water-culture method of studying plant nutrition developed by Doctor Nobbe and for the work done in helping to establish the relation between the root tubercles of leguminous plants and the fixation of atmospheric nitrogen. The work of the station includes also the investigation of other phases of plant growth, plant diseases, soil bacteriology, and forestry problems.

Agricultural Experiment Station, Triesdorf, Bavaria.

Station staff.—Prof. Ph. Schreiner, *Dir.;* A. Kleeman, *Chief of Chem. Work;* F. Zeis, *Asst. Chem.;* H. Behr, *Chief of Seed Control Work.*

Origin.—Founded in 1874 by the district committee of the Agricultural Society of Mittelfranken.

Equipment.—Vegetation house and experimental field.

Income.—For 1903, $954.38 (district, $261.80; agricultural society, $311.78; fees, $380.80).

Lines of work.—Investigation of agricultural and related problems, and of fertilizers, feeding stuffs, and seeds.

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[a] Retired from active duty October 1, 1904.

Forestry Experiment Station of the University, Tübingen, Württemberg.

Prof. T. von Lorey, *Dir.*

The department of forestry in this university has an annual appropriation of about $1,095 for use in forestry investigations.

Laboratories of the Royal Academy of Agriculture and Brewing, Weihenstephan, Bavaria.

Governing board.—Under the control of the Ministry of Religion and Public Instruction.

Station staff.—Prof. H. Vogel, *Dir.* I. Division of Agriculture: Prof. M. Bücheler (four assistants), *Distilling;* Prof. Th. Henkel, *Dairy;* Höflich, *Agr. Micros.;* Prof. Kraus (two assistants), *Seed Testing and Growing;* Prof. H. Puchner, *Machine Testing;* Professor Wagner (one assistant), *Field Expts. and Plant Growth;* Prof. E. Wein (two assistants), *Agr. Chem.;* Prof. H. Puchner, *Soils;* Prof. J. E. Weiss, *Plant Protection and Plant Diseases;* Prof. E. Wein (one assistant), *Moor Culture.* II. Division of Brewing: Professor Ganzenmüller (one assistant), *Machine Tech.;* Professor Krandauer, *Chem.;* Doctor Luff, *Fermentation;* Prof. H. Vogel (eight assistants), *Brewing Tech.*

Origin.—Experiments at Weihenstephan were begun in 1888, in connection with the work of the Royal Academy. Nearly all members of the station staff are also members of the academy teaching force, and there is no very clear distinction between their duties as investigators and as instructors. A moor culture laboratory was added April 3, 1903.

Equipment.—The experimental work is carried on in the laboratories of the academy, among which are laboratories for chemistry, agricultural chemistry, dairying, microscopy, soil physics, seed testing, machine technology, distilling, brewing, pure-seed culture, and moor culture. There are also experiment fields, a botanic garden, an apiary, fishery, hop garden, brewery, distillery, arboretum, and other accessories.

Income.—For 1900, State subsidy amounting to about $952.

Lines of work.—Experiments with field crops, seeds, and soils; investigation of diseases of plants, dairy problems, and problems connected with brewing and distilling.

Viticultural Experiment Station, Weinsberg, Württemberg.

Governing board.—Ministry of Religion and Public Instruction.

Station staff.—Prof. R. Meissner, *Dir.;* two assistants; one helper.

Origin.—Established in 1900 by the government of Württemberg.

Equipment.—Chemical and microscopical laboratories, balance room, culture room, sterilizer room, and workroom for the director.

Income.—For 1901, $737.80, of which $690.20 was appropriated by the State.

Lines of work.—Breeding and distribution of pure-wine yeast, chemical and microscopical investigation of faults and diseases of wines, determination of diseases of grapevines, and the giving of advice and instruction in cellar management in methods of combating diseases of the vine. The station maintains short special courses in various phases of wine production and is headquarters for general agricultural information in Stuttgart.

Experiment Station, Wiesbaden, Prussia.

Governing board.—Chamber of Agriculture of the District of Wiesbaden.

Station staff.—Prof. H. Fresenius, *Dir.;* F. Ruppel, *Chem.*

Origin.—Founded in 1881 by the Agricultural and Forestry Society of Nassau.

Equipment.—The station is maintained in connection with the famous Fresenius Analytical Laboratory, and uses the equipment of this laboratory.

Income.—For 1903, $1,166.20 (State, $571.20; fees, $595).

Lines of work.—Scientific investigations and control of fertilizers and feeding stuffs.

Dairy Experiment Station and Institute, Wreschen, Prussia.

Governing board.—Chamber of Agriculture of the Province of Posen.

Station staff.—Dr. H. Tiemann, *Dir.;* K. Teichert, *Asst. Dir.*

Origin.—Established in 1897.

Equipment.—A chemical and bacteriological laboratory, a machine-testing room, library, and an experimental cheese factory.

Income.—For 1902, $3,439.10 (State, $952; Chamber of Agriculture, $1,166.20; Province of Posen, $476; fees, $844.90).

Lines of work.—In connection with the instruction of students, considerable scientific investigation is carried on. This includes the testing of dairy machinery, investigations in connection with cheese and butter making, and analytical work. The station analyzes on an average 20,000 samples of cheese for dairy authorities.

District Agricultural Experiment Station, Würzburg, Bavaria.

Station staff.—Dr. Th. Omeis, *Dir.;* S. Schulhöfer, *Asst. Chem.;* one laboratory assistant; one gardener.

Origin.—Organized in 1868 by the district agricultural committee of Unterfranken and Aschaffenburg; reorganized in 1898.

Equipment.—Chemical, botanical, and bacteriological laboratory; experimental wine cellar and vineyard.

Income.—For 1903, $2,856 (State and district, $952; fees, $1,904).

Lines of work.—Scientific investigations in the interest of agriculture and industries related to agriculture, including viticulture, control of fertilizers, feeding stuffs, and seeds; official investigations for the royal customs authorities. The station is the State bureau of information on plant protection and plant diseases.

GOLD COAST.

Botanic Garden, Aburi.[a]

Governing board.—Botanic Department, W. H. Johnson, *Chief.*

Staff.—W. H. Johnson, *Cur.;* A. E. Evans, *Asst. Cur.;* J. C Stoner, *Overseer;* J. S. Martinson, *Asst. in Charge of Accra Cocoanut Plantation;* E. A. Brew, *Asst. in Charge of Christiansborg Castle Garden;* two clerks.

Equipment.—Botanic garden and plantations of rubber and kola trees at Aburi, and of cocoanut palms at Accra; nurseries containing about 100,000 economic plants in pots and 50,000 in nursery rows; greenhouses; potting house; herbarium, etc.

Lines of work.—The botanical department, through the agency of the Botanic Garden, is engaged in promoting agricultural interests throughout the colony, and to this end is propagating and distributing economic plants and seeds, including those of tobacco, cotton, fiber plants, rubber trees, spice plants, cacao, kola, coffee, and others suitable to a tropical climate. Annual reports are published.

GREAT BRITAIN.

Board of Agriculture and Fisheries, London.

The Right Hon. The Earl of Onslow, G. C. M. G., *Pres.;* Sir T. H. Elliott, K. C. B., *Sec.;* Walter E. Archer, *Asst. Sec. in charge of Fishery Interests.*

In England and Wales government aid for agricultural education and experimental research is made through the agency of the Board of Agriculture and Fisheries, which was established in 1889, and "consists of the Lord President of the Council, His Majesty's Principal Secretaries of State, the First Commissioner of the Treasury, the Chancellor of the Exchequer, the Chancellor of the Duchy of Lancaster, and the Secretary for Scotland, with such other persons as His Majesty may from time to time think fit to appoint during his pleasure." During the past thirteen years the board has made general grants in aid of agricultural instruction and research to such colleges and local institutions as have carried on their work in a manner to meet its approval. In 1902–3 these grants amounted to $43,254 and were made

[a] See Royal Gardens, Kew, p. 161.

to ten colleges, two farm schools, and three dairy institutes. The colleges are now cooperating in educational and research work with forty separate administrative counties, the colleges furnishing lecturers for local instruction and providing for the proper supervision of local demonstration plats and agricultural experiments. The grants to dairy institutes were made because these institutions possessed exceptional facilities for instruction or were in districts not served by the collegiate centers.

In addition to class-room instruction, these subsidized institutions engage in two lines of scientific work, namely, field demonstrations and agricultural experiments conducted at the collegiate centers or at various places in the county or in adjacent counties. The former are intended merely to demonstrate to college students and to farmers the value of improved methods of culture; the latter more nearly approach scientific investigation, although they are confined mostly to field experiments.

The Board of Agriculture also makes special grants to a number of colleges and other institutions for the investigation of special problems in agriculture. In 1902–3 these special grants amounted to $4,199.04, and were given to one university, four colleges, one agricultural and dairy institute, four societies, and the Somerset County Council.

Agricultural Research Association, Aberdeen, Scotland.

Governing board.—Executive committee appointed by the subscribers and the director.

Station staff.—Thomas Jamieson, *Dir.;* several assistants.

Origin.—Organized in 1875.

Equipment.—Station building, experiment field, vegetation house, laboratory, large rain gauge, and observatory.

Income.—For 1901–2, $1,460 (Board of Agriculture and Fisheries, $487; local subscriptions, $973).

Lines of work.—Research investigations on farm crops. Annual reports are issued to subscribers, agricultural societies, agricultural chemists, farmers, and others.

University College of Wales (Agricultural Department), Aberystwyth, Wales.

Staff.—D. D. Williams, *Lect. in Agr.;* William Edwards, *County Lect.;* J. Allan Murray, *Agr. Chem. and Analyst;* A. E. Jones, *Agr. Surveying, Engin. and For.;* Bessie L. Brown, *Dairying;* J. H. Appleton, *Draw. and Building Construction;* J. L. Pickard, *Hort.*

Income.—For 1902–3, $13,680.38 (Board of Agriculture and Fisheries, $3,892; county councils, $9,058.63; fees and miscellaneous, $729.75).

Lines of work.—Demonstration experiments with various nitrogenous manures on grass land in seven different places in Cardiganshire, Carmarthenshire, Montgomeryshire, and Pembrokeshire.

Agricultural Experiment Station of the Royal Agricultural Society of England (Woburn Experimental Farm), Aspley Guise, R. S. O., Beds.

Governing board.—The Council of the Royal Agricultural Society, acting under the chemical and Woburn committee.

Station staff.—Dr. J. A. Voelcker, *Dir.;* W. H. Hogg, *Resident Farm Mgr.;* H. M. Freear, *Asst. Chem.*

Origin.—Founded and endowed by Hastings Russell, Ninth Duke of Bedford, in 1877, for the purpose of ascertaining the values of manure obtained by the consumption of different kinds of purchased feeds. Pot culture station added in 1898.

Equipment.—Farm buildings, including feeding boxes; chemical laboratory; buildings and complete equipment for pot-culture experiments; experiment fields, comprised in a farm of 137 acres.

Income.—About $4,300 per year from endowment funds.

Lines of work.—Field experiments, including rotations, continuous growing of wheat and barley with different manures, growing of varieties of barley and other cereals, testing of varieties of clovers and forage crops, green manuring; experiments in the laying down and subsequent treatment of permanent pastures; investigation of silage; feeding experiments; pot experiments in plant nutrition; diseases of root crops, potatoes, etc.

University College of North Wales (Agricultural Department) and Farm, Bangor.

Governing board.—Court of governors appointed by His Majesty's Privy Council, various public bodies, and subscribers.

Staff.—Thomas Winter, M. A., *Agr.;* James J. Dobbie, M. A., D. Sc., *Chem.;* A. Baguley, *Asst. Agr. Chem.;* Reginald W. Phillips, M. A., D. Sc., *Bot.;* Philip J. White, M. B., *Zool. and Ent.;* G. H. Bryan, D. Sc., *Math.;* E. Taylor Jones, D. Sc., *Phys.;* Griffith Evans, M. D., *Vet.;* a number of assistants and lecturers.

Origin.—Founded in 1884 and incorporated by Royal Charter in 1885.

Equipment.—Well-equipped chemical, physical, botanical, and zoological laboratories, with museum attached; farm of 600 acres.

Income.—For 1902–3, $10,775.98 (Board of Agriculture and Fisheries, $4,865; county councils, $4,806.62; students' fees, $447.58; miscellaneous, $656.78).

Lines of work.—Experiments in manuring various farm crops, testing new varieties, feeding experiments with cattle and sheep; experiments in breeding; investigation of crop diseases. Demonstration experiments are carried on in different localities.

Bath and West and Southern Counties Society, Bath.

Staff.—Sir C. T. D. Acland, *Chair. of Experiments Committee;* T. H. Plowman, *Sec. of Society.* All experiments conducted under the auspices of the Bath and West and Southern Counties Society are in charge of the experiments committee.

Origin.—During the past twenty years this society has carried on a system of demonstration experiments at various places in the counties of southern and western England for the purpose of improving farm methods.

Income.—For 1902–3, grants from the Board of Agriculture and Fisheries, amounting to $1,581.61 (for investigation on the origin and cause of flavor in dairy products, $973.30; cider experiments, $486.65; manure, and mutton experiments, $121.66).

Lines of work.—Demonstration experiments in seeding and manuring permanent meadows, investigation of the origin and cause of flavor in dairy products, cider experiments, experiments in the production of mutton. The cider experiments have extended over a period of about eight years, and have resulted in considerable improvement in the quality of cider produced.

Cambridge University (Agricultural Department), Cambridge.

Staff.—T. H. Middleton, M. A., M. Sc., *Agr.;* T. B. Wood, M. A., *Agr. Chem.;* R. H. Biffen, M. A., *Agr. Bot.;* R. A. Berry, *Asst. Chem.;* J. Goodchild, B. A., *Supt. Field Work;* H. Henshaw, *Farm Mgr.*

Origin.—The present university department was founded in 1899 to take up the work which had, since 1893, been carried on by an informal committee of university professors and county council representatives.

Equipment.—The Agricultural Department is at present accommodated in the botanical and chemical laboratories of the university. It also has a farm of 150 acres, and conducts experiments at other selected places in the eastern counties of England.

Income.—For 1902–3, $14,434.45 (Board of Agriculture and Fisheries, $5,122.85; county councils, $4,086.60; other sources, $5,225).

Lines of work.—Investigations on the manuring and breeding of field crops and study of other agricultural problems. Demonstration experiments are carried on in different localities.

University Botanic Garden, Cambridge.[a]

Staff.—Prof. H. M. Ward, *Cur.;* and a number of assistants.

Essex Technical Laboratories, Essex County Council, Chelmsford.

Governing board.—The Essex Education Committee of Essex County Council.

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[a] See Royal Gardens, Kew, p. 161.

Station staff.—T. Dymond, *Chem.;* G. Clarke, H. T. Cranfield, *Assts. Chem.;* E. C. Horrell, *Biol.;* F. J. Chittenden, *Asst. Biol.;* B. W. Bull, *Asst. Agr.;* C. Wakely, *Hort.;* Miss A. Matthews, *Dairying;* E. G. Hardy, *Asst. in Dairying.*

Equipment.—Three laboratories; library; botanic garden of 3 acres, with a range of greenhouses; a small garden with greenhouse at the laboratories; a small modern station.

Lines of work.—Manurial experiments with field crops; bacteriological investigations, especially in dairy work; experiments in horticulture; investigation of plant diseases; marine biological research; instruction in nature study and horticulture to teachers.

Royal Agricultural College and Farm, Cirencester.

Governing board.—This is a private institution, under the patronage of His Majesty King Edward VII.

Station staff.—Rev. J. B. McClellan, M. A., *Prin.;* Prof. E. Blundell, *Agr. and Dairy;* Russell Swanwick, *Dir. of Farm;* Andrew Kay, *Dairy Mgr.;* Prof. E. Kinch, *Chem.;* W. James, *Asst. Chem.;* Prof. G. H. Wooldridge, *Bact. and Vet.;* Prof. G. T. Locke, M. A., *Phys. and Mech.;* Prof. George Paton, C. E., *Surveying and Engin.;* Prof. G. S. West, M. A., *Bot., Geol., and Zool.;* Dr. W. Schlich, *For.;* a number of other professors and assistants not directly connected with the experimental investigations.

Origin.—The college was founded in 1845. Systematic experiments were begun in 1889.

Equipment.—Farm of 500 acres, botanic garden, college laboratories, farm buildings, and veterinary hospital.

Income.—The college is supported by private contributions and by fees received from students.

Lines of work.—Manurial experiments on field crops, grasses, and pastures; experiments in the continuous raising of various grains on the same plats; chemical analysis of farm products; feeding experiments.

Experiment Station, Dalmeny Park, England.

The Earl of Rosebery has for several years maintained a private experiment station at his Dalmeny Park estate, 6 miles from Edinburgh. The experiments are carried on in the interest of the estate, which comprises about 6,000 acres. The work is mainly of a practical character and is carried on by the men in charge of the various departments, no trained specialists being employed. Experiments are made with fertilizers for different crops, especially in the use of lime and in studying the residual effects of fertilizers. The combating of plant diseases also receives attention. Plant selection is practiced, espe-

cially with the potato to develop varieties for seed. Considerable work is done in feeding cattle for the market, and in crossing Aberdeen Angus and Galloway with the Shorthorn, pure-bred stock being used in all cases. While not of a scientific character, the results of the station's work have proved very helpful as a guide to good practice. No publications are issued.

Department of Agriculture and Technical Instruction for Ireland, Dublin, Ireland.

The Right Hon. G. Wyndham, *Chief Secretary for Ireland, Pres.;* The Right Hon. Horace Plunkett, *V.-Pres.;* T. P. Gill, *Sec.*

The Department of Agriculture and Technical Instruction for Ireland was organized in 1900 for the purpose of "aiding, improving, and developing the agriculture, fisheries, and other industries of Ireland * * * in such a manner as to stimulate and strengthen the self-reliance of the people."

The organization of the department comprises a staff paid from funds appropriated by Parliament, with which are associated four advisory and cooperating boards or committees, the members of which are appointed partly by local county or borough authorities, partly by the department, and partly by other officials. These advisory bodies are the council of agriculture, the agricultural board, the board of technical instruction, and the consultative committee of education.

The department is provided with an endownent of $807,839, together with funds for maintaining a number of institutions turned over to it.

The work of the department has been divided into 6 branches, namely, agriculture, technical instruction, fisheries, statistics and intelligence, veterinary science, and accounts. The various enterprises in charge of the department are promoted by subsidizing and otherwise encouraging local effort on the part of the counties, boroughs, and associations, the department holding itself in readiness to give expert advice when needed. For this purpose special committees on live stock, horse breeding, flax, fisheries, etc., have been organized in the department. The distinctive agricultural features already inaugurated are along the lines of agricultural instruction, the improvement of live stock, and agricultural experiments and investigation. The plans for the improvement of live stock include the introduction of pure-bred stallions and bulls, which are loaned or sold on contract to farmers, and the distribution of awards for approved animals grown by the farmers. The building of cooperative creameries, the erection of plants for pasteurizing milk, and the promotion of other means for encouraging dairy husbandry have been brought about by a system of loans. A variety of cooperative experiments have been carried out for the purpose of introducing tobacco growing, improving methods of cultivation, and

reviving flax culture, which has greatly fallen off in Ireland in recent years. Other enterprises, also, mostly of a practical nature, have been encouraged.

Royal Dublin Society, Dublin.

Staff.—Right Hon. Lord Ardilaun, *Pres.*

The Royal Dublin Society was founded in the year 1731 and is incorporated by Royal Charter for the advancement of agriculture and other branches of industry and for the advancement of science and art.

Its income is $121,663 per annum and is derived from subscriptions and other private sources. The agricultural work of this society is carried on mainly by means of shows, three being held each year on the society's grounds near Dublin. It has no permanent experiment station, but agricultural experiments are carried on from time to time by members in various parts of the country.

Trinity College Botanic Gardens, Dublin. [a]

Experiment Station of the Highland and Agricultural Society of Scotland (Pumpherston), Edinburgh, Scotland.

Governing board.—Highland and Agricultural Society of Scotland, James McDonald, *Sec.*

Station staff.—Dr. A. P. Aitken, *Dir.;* Dr. A. McAlpine, *Consulting Bot.*

Income.—This society received in 1902–3 from the Board of Agriculture and Fisheries $364.88 with which to conduct experiments in the use of manure and the production of mutton.

Lines of work.—Agricultural experiments at Pumpherston and on selected farms in different parts of the country.

Royal Botanic Garden, Edinburgh, Scotland. [a]

I. B. Balfour, *Keeper.*

The West of Scotland Agricultural College, Glasgow.

Governing board.—Representatives elected by the County Councils of the Southwest of Scotland, by the Glasgow and West of Scotland Technical College, Glasgow University, and the Highland and Agricultural Society.

Station staff.—Prof. R. Patrick Wright, *Dir. and Agr.;* W. S. D. Nidhope, *Supt.;* John Cuthbertson, *Sec.*

Origin.—The research work was organized by the Scotch Education Department in 1899.

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[a] See Royal Gardens, Kew, p. 161.

Equipment.—Experiment field at Kilmarnock; experiment plats on selected farms in the southwest of Scotland.

Income.—For the purpose of investigating problems in the production of mutton, and in the application of manures the West of Scotland Agricultural College received in 1902–3 a grant of $364.88 from the Board of Agriculture and Fisheries.

Lines of work.—Experiments at Kilmarnock and on selected farms in several other localities with field crops to test the value of various manures; feeding experiments, especially with mutton sheep; the improvement of poor hill pastures; rotation experiments.

Botanic Gardens, Glasgow.[a]

Governing board.—The Botanical Subcommittee of the Corporation of Glasgow.

Staff.—The superintendent (James W. Whitton) and the foreman of parks and botanic gardens.

Origin.—Founded in 1818 by Royal Charter. Taken over by the corporation as a public park and botanic garden in 1891.

Lines of work.—Horticulture.

Royal Botanic Gardens, Glasnevin, near Dublin.[a]

F. W. Moore, *Keeper.*

Aynsome Agricultural Station, Grange-over-Sands, Lancashire.

Station staff.—John S. Remington, *Dir., Chem. and Bot.;* T. M. Remington, *Agr. and Farm Mgr.;* Claude Smith, *1st Asst. Chem.;* Frank Butler, *2d Asst. Chem.;* John E. Rigg, *Soil Analyst;* K. M. C. Butterworth, *Seed Analyst;* Robert Addison, *Farm Supt.;* Daniel Finlayson, *Grass Expert;* Thomas Wilkinson, *Elect. Engin.;* B. Jacobs, *Sec.*

Origin.—Founded in 1901 as a private experiment station by J. S. and T. M. Remington, who, during the last three years have been conducting experiments at Aynsome Farm.

Equipment.—The buildings include a chemical laboratory; a large laboratory for general work; a smaller laboratory for plant analysis; a balance room; a library; a botanical laboratory with small greenhouse for physiological work; a machine room equipped with electric motor and heating and lighting machine; a large greenhouse at the farm station equipped with tramways and surrounded by three-fourths of an acre occupied by small plats, cylinders, and zinc pots; a model dairy; a feeding house with eight stalls; a digestion house with two stalls; a model silo, and complete meteorological apparatus. The farm consists of 275 acres of land with the ordinary buildings and experimental plats covering 11 acres.

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[a] See Royal Gardens, Kew, p. 161.

Income.—The station is maintained at the expense of the director.

Lines of work.—Investigations in agricultural chemistry, plant physiology, and soils; feeding experiments with sheep and cattle; seed testing, and practical work in dairying and general farming. In addition to the investigations carried on, the station receives students for instruction in chemistry and agriculture.

Lawes Agricultural Trust, Rothamsted Experiment Station, Harpenden.

Governing board.—Trustees: Lord Avebury, Lord Walsingham, and Sir John Evans. Managing committee: Four members nominated by the Royal Society, two by the Royal Agricultural Society of England, and one each by the Chemical Society and the Linnean Society.

Station staff.—A. D. Hall, M. A., *Dir. and Chem.;* N. H. J. Miller, Ph. D., *Chief Asst.;* chemical and botanical assistants; record keepers, and clerical staff.

Origin.—Founded by Sir John B. Lawes in 1843; reorganized in 1889 when Sir J. B. Lawes transferred the station to the Lawes Agricultural Trust and endowed it with $486,650.

Equipment.—Laboratory building containing chemical and botanical laboratories; sample house containing 50,000 specimens; rain and drain gauges; experimental fields covering 40 acres.

Income.—Proceeds of the Lawes endowment of $486,650.

Lines of work.—Field experiments, including various rotations with and without manure; growing wheat, barley, and other crops on the same ground year after year without manure, with barnyard manure, and with commercial fertilizers; feeding experiments; meteorological observations; investigations of composition of rain and drainage waters; chemical and botanical investigations of vegetable and meat products; investigation of plant growth in relation to root tubercles and the assimilation of atmospheric nitrogen.

Agricultural and Horticultural School, Holmes Chapel.

Staff.—W. Angus, B. S., *Prin. and Agr.;* S. Blore, *Surveying, Engin., and Bookkeeping;* H. Thompson, B. S., *Chem.;* J. W. Eastham, B. S., *Bot., Zool., Geol.;* W. Neild, *Hort.;* E. W. Richardson, *Poultry Keeping;* P. Manuel, *Vet.*

Origin.—Established by the Cheshire County Council in 1895.

Equipment.—Farm of 90 acres and farm buildings; a garden of 7 acres devoted to the growth of fruit, vegetables, and flowers; dairy cattle, a small flock of sheep, and pigs.

Income.—For 1902–3, $21,021.67 (Board of Agriculture and Fisheries, $973; Cheshire County Council, $10,975.44; Board of Education, $754.08; fees, $1,581.13; farm products and miscellaneous, $6,738.02).

Lines of work.—Field experiments with potatoes, cereals, and manurial treatment of swedes and mangels; fruit growing. About 12,000

reports are annually distributed among the farmers of the county, while the number of visitors who come to see the farm and garden amounts to some 1,000 persons in the course of the year.

Royal Gardens, Kew.

Station staff.—Sir W. T. Thiselton-Dyer, *Dir.;* ——— ———, *Private Sec.;* W. B. Hemsley, *Keeper of Herbarium and Libr.;* D. H. Scott, *Honorary Keeper, Jodrell Laboratory;* J. M. Hillier, *Keeper of Museums;* W. Watson, *Cur. of the Gardens.*

Origin.—The Dowager Princess of Wales established a private botanic garden in 1759. In 1840 this was adopted as a national establishment.

Equipment.—Two large greenhouses, twenty-four other houses, museums, botanical laboratory, herbariums, and library, botanic garden, and arboretum of about 300 acres.

Income.—Annual grants from Parliament of about $126,529.

Lines of work.—General botanical research; collecting trees, shrubs, and plants in all parts of the world; classifying the same, and investigating their economic value.

The following botanical gardens and botanic stations of the British Isles and colonies cooperate with Kew and are assisted in their work largely by the Kew authorities:

BRITISH ISLES.

Cambridge.—University Botanic Garden: Prof. H. M. Ward.
Dublin:
Royal Botanic Gardens, Glasnevin: F. W. Moore, *Keeper.*
Trinity College Botanic Gardens:
Edinburgh.—Royal Botanic Garden: Prof. I. B. Balfour, *Keeper.*
Glasgow.—Botanic Gardens: Prof. Jas. W. Whitton, *Supt.*
Oxford.—University Botanic Garden: Prof. S. H. Vines.

COLONIES.

Bermuda.—Botanic Station: G. A. Bishop, *Supt.*
British Central Africa.—Scientific Department.
Zomba: J. McClounie, *Head of Dept.*
British East Africa:
Uganda.—Botanic Station, East Africa Protectorate: Alexander Whyte, *Bot.*
Zanzibar—
Dunga: Agricultural Department, R. N. Lyne, *Dir. of Agr.*
Dunga Experiment Station, W. Buzzacott, *Supt.*
Zanzibar: Victoria Gardens, W. Buzzacott, *Cur.*
British Guiana:
Berbice.—Botanic Garden: J. Nardamoonie, *Keeper.*
Georgetown.—Botanic Garden: A. W. Bartlett, *Supt. and Govt. Bot.*
British Honduras:
Belize.—Botanic Station: Eugene J. F. Campbell, *Cur.*

British West Indies:
Antigua.—Botanic Station and Sugar Cane Experiments: W. H. Patterson, *Cur.*
Barbados—Imperial Department of Agriculture: D. Morris, *Comr.*
Dodd's Reformatory, Botanic Station and Sugar Cane Experiments: J. R. Bovell, *Supt.*
Dominica.—Botanic Station: Joseph Jones, *Cur.*
Grenada.—Botanic Station: W. E. Broadway, *Cur.*
Jamaica.—Kingston: Department of Public Gardens and Plantations: Wm. Fawcett, *Dir.*
Hope Gardens: Wm. Harris, *Supt.*
Hope Experiment Station: Wm. Harris, *Supt.*; T. J. Harris, *Agr. Instr.*
Castleton Gardens: Wm. Harris, *Supt.*; J. Campbell, *Asst. Supt.*
Cinchona (Hill Garden): Wm. Harris, *Supt.*
Kingston Parade Garden: W. J. Thompson, *Supt.*
King's House Garden: James Briscoe, *Supt.*
Bath: A. Groves, *Overseer.*
Montserrat.—Experiment Stations: A. J. Jordan, *Agr. Instr.*
St. Kitts-Nevis.—Botanic Station and Sugar Cane Experiments: F. R. Shepherd, *Actg. Cur.*
St. Lucia.—Botanic Station: J. C. Moore, *Agr. Supt.*
St. Vincent.—Botanic Station: W. N. Sands, *Agr. Supt.*
Tobago.—Botanic Station: H. Millen, *Cur.*
Trinidad.—Botanic Gardens and St. Clair Experiment Station: J. H. Hart, *Supt.*
Virgin Islands—
Tortola.—Experiment Station: W. C. Fishlock, *Agr. Instr.*
Canada:
Ottawa.—Botanic Garden: Prof. J. Macoun, *Dominion Bot.*
Cape of Good Hope.—Cape Government Herbarium: Prof. P. MacOwan, *Bot.*
Ceylon:
Peradeniya.—Department of Royal Botanic Gardens: J. C. Willis, *Dir.;* Hugh F. McMillan, *Cur.*
Anuradhapura.—Branch Botanic Garden: D. F. de Silva, *Con.*
Badulla.—Branch Botanic Garden: D. T. de Alwis, *Con.*
Hakgala.—Branch Botanic Garden: William Nock, *Supt.*
Henaratgoda.—Branch Botanic Garden: W. Perera, *Con.*
Nawara Eliya.—Branch Botanic Garden: D. Michael, *Con.*
Falkland Islands.—Government House Garden: Albert Linney, *Head Gard.*
Fiji.—Botanic Station: Daniel Yeoward, *Cur.*
Gambia.—Botanic Station.
Gold Coast:
Aburi.—Botanic Garden: W. H. Johnson, *Cur.*
Hongkong.—Botanic and Afforestation Department: Charles Ford, *Supt.*
India:
Bengal—
Darbhangah.—Maharajah's Garden: Herbert Thorn, *Supt.*
Darjeeling.—Lloyd Botanic Garden: G. H. Cave, *Cur.*
Calcutta.—Agri-Horticultural Society of India: P. Lancaster, *Sec.*
Mungpoo.—Government Cinchona Plantations: D. Prain, *Supt.*
Sibpur.—Department of Royal Botanic Gardens: D. Prain, *Supt.*
Bombay Presidency—
Bombay.—Municipal Gardens: C. D. Mahaluxmivala, *Supt.*
Ghorpuri, Poona.—Botanic Garden: P. S. Kanetkar, *Supt.*
Karachi.—Municipal Garden.

India—Continued.
Bombay Presidency—Continued.
Poona.—Botanic Department of the College of Science: Prof. G. A. Gammie, *Dir.*
Central Provinces—
Nagpur.—Horticultural Gardens: J. Horne Stephen, *Supt.*
Madras—
Madras.—Agri-Horticultural Society: A. G. Bourne, *Hon. Sec.*
Ootacumund.—Botanic Garden: R. L. Proudlock, *Cur.*
Ootacumund.—Government Cinchona Plantations: W. M. Standen, *Dir.*
Native States—
Bangalore, Mysore.—Botanic Gardens: J. Cameron, *Supt.*
Barada.—Botanic Garden: G. H. Krumbiegel, *Supt.*
Gwalior.—Botanic Garden: C. Maries, *Supt.*
Morvi.—Botanic Garden: Joseph Beck, *Supt.*
Trivandrum, Travancore.—Museum and Botanic Gardens: H. S. Ferguson, *Dir.*
Udaipur.—Botanic Garden: T. H. Storey, *Supt.*
United Provinces of Agra and Oudh.
Agra.—Taj Garden: A. E. P. Griessen, *Supt.*
Allahabad.—Government Gardens: H. J. Davies, *Supt.*
Cawnpore.—Botanic Gardens: Norman Gill, *Supt.*
Kumaon (Ramghur).—Botanic Garden: F. W. Seers, *Supt.*
Lucknow.—Government Horticultural Garden: Matthew Ridley, *Supt.*
Saháránpur.—Botanic Department, Northern India: J. F. Duthie, *Dir.*
Saháránpur.—Botanic Gardens: William Gollan, *Supt.*
Punjab—
Lahore.—Botanic Garden: H. G. Hein, *Supt.*
Lagos.—Botanic Station: E. W. Foster, *Cur.*
Malay States.—Experimental Plantations: Stanley Arden, *Supt.*
Perak (Taiping).—Government Gardens and Plantations: Robert Derry, *Supt.*
Malta.—Argotti Botanic Garden: Prof. Francesco Debono, *Dir.*
Mauritius:
Curepipe.—Botanic Gardens: F. Bijoux, *Overseer.*
Pamplemousses.—Department of Forests and Botanic Gardens: J. Vankeirsbilck, *Dir.*
Réduit.—Botanic Gardens: W. A. Kennedy, *Overseer.*
Natal:
Durban.—Botanic Gardens: J. M. Wood, *Cur.*
Pietermaritzburg.—Botanic Garden: Geo. Robertson, *Cur.*
New South Wales:
Sidney—
Botanic Gardens and Domains: J. H. Maiden, *Dir. and Bot.*
Technological Museum: R. T. Baker, *Cur.*
New Zealand:
Christchurch.—Colonial Botanic Garden: Ambrose Taylor, *Head Gard.*
Dunedin.—Colonial Botanic Garden: J. McBean, *Supt.*
Invercargill.—Colonial Botanic Garden: Thomas Waugh, *Head Gard.*
Napier.—Colonial Botanic Garden: W. Barton, *Supt.*
Wellington.—Colonial Botanic Garden: G. Gibb, *Head Gard.*
Queensland:
Brisbane—
Botanic Department: F. M. Bailey, *Colonial Bot.*
Botanic Gardens: Philip MacMahon, *Cur.*

Queensland—Continued.
Brisbane—Continued.
Acclimatization Society: Edward Grimley, *Sec. and Agr.*
Rockhampton.—Acclimatization Society's Gardens: J. S. Edgar, *Supt.*
Seychelles.—Botanic Station: R. Dupont, *Cur.*
Sierra Leone.—Botanic Station: J. P. Quinton, *Cur.*
South Australia:
Adelaide.—Botanic Garden: Maurice Holtze, *Dir.*
Port Darwin.—Botanic Garden: Nicholas Holtze, *Cur.*
Southern Nigeria:
Old Calabar.—Botanic Garden: —— ——, *Cur.*
Straits Settlements:
Penang.—Botanic Garden: Chas. Curtis, *Asst. Supt.*
Singapore.—Botanic Gardens: H. N. Ridley, *Dir.*
Tasmania:
Hobart.—Botanic Gardens: F. Abbott, *Supt.*
Victoria:
Melbourne—
Botanic Gardens: W. R. Guilfoyle, *Cur.*
National Herbarium: J. G. Luehmann, *Cur.*
Western Australia:
Perth.—Department of Agriculture: Alexander Morrison, *Bot.*

Midland Agricultural and Dairy Institute, Kingston-on-Soar.

Governing board.—A committee appointed by the County Councils of Derbyshire, Leicestershire, Lincolnshire, and Nottinghamshire.

Staff.—M. J. R. Dunstan, M. A., *Dir. and Agr.;* J. F. Blackshaw, *Resident Mgr.;* F. Wakerley and J. Murray, B. Sc., *Agrs.;* J. Golding, *Chem. and Bact.;* A. Levie, *Vet.;* J. P. W. Marx and J. O. Wallace, B. A., *Poultry Mgrs.;* E. Luckhurst and J. Smith, *Horts.;* A. Thornley, M. A., *Ent.;* J. Matthews, *Farm Supt.;* G. Hayes, *Apiculture;* other officers not connected with scientific agricultural investigations.

Origin.—The dairy department was established in 1895 and the agricultural department in 1900, the latter being transferred from University College of Nottingham.

Equipment.—Buildings containing well-equipped laboratories located on the institution farm at Kingston.

Income.—For 1902–3, $47,550.51 (Board of Agriculture and Fisheries, $3,648.75; county councils, $17,149.12; fees and miscellaneous, $6,144.50; farm and dairy, $20,608.14).

Lines of work.—On the institution farm the investigations consist of feeding experiments with dairy cattle and pigs, experiments to test the residual value of phosphates, manurial trials on grass land, spraying for charlock, and the investigation of remedies for abortion in cattle. In other selected localities the experiments include variety tests of potatoes and barley; rotation experiments; fertilizer experiments with potatoes, flax, wheat, and grass land; tests of green manuring *v.* feeding the crop on the land, and a number of experiments for improving grass lands.

Yorkshire College (Agricultural Department), Leeds.

Staff.—R. S. Seton, *Agr.;* R. W. Haydon, C. F. Archibald, *Lects. in Agr.;* J. G. Stewart, *Asst. Lect. in Agr.;* C. Crowther, *Agr. Chem.;* C. Steel, *Vet. Sci.;* E. Percy Kaye, *Math. and Phys.;* L. C. Miall, *Nat. Hist. and Ent.;* Wm. G. Smith, *Agr. Bot. and For.:* N. Walker, *Bot.;* J. Goodman, *Agr. Engin. and Land Survey.;* P. F. Kendall, *Agr. Geol.*

Income.—For 1902–3, $24,762.85 (Board of Agriculture and Fisheries, $4,865; subscriptions, $729.75; fees, $3,410.36; Yorkshire Council for Agricultural Education, $15,485.30; miscellaneous, $272.44).

Lines of work.—Experiments in the manuring of meadows, pastures, potatoes, swedes, mangels, and turnips; variety tests with barley, wheat, oats, mangels, potatoes, swedes, and turnips; experiments with red clover from different countries; experiments in rearing calves and in sheep crossing. Demonstration experiments are carried on in different localities.

Durham College of Science (Department of Agriculture and Forestry) and Farm, Newcastle-upon-Tyne.

Staff.—Prof. D. A. Gilchrist, *Dir.;* C. Bryner Jones, *Lect. in Agr.;* S. H. Collins, *Lect. in Agr. Chem.;* A. Meek, *Lect. in Animal Physiol.;* George Bell, *Farm Mgr.;* J. H. J. Farquhar, *Sec.;* George Berry, *Hort.;* A. T. Gillanders, *For.*

Equipment.—Lecture rooms and libraries, farm of 400 acres, numerous temporary plats containing nearly an acre each.

Income.—For 1902–3, $12,707.38 (Board of Agriculture and Fisheries, $4,865; county councils, $6,178.55; fees and miscellaneous, $1,663.83).

Lines of work.—Breeding and feeding experiments with domestic animals, especially sheep; experiments with fertilizers on farm crops; variety tests; analysis of soils, fertilizers, feeding stuffs, and farm crops; investigations for farmers. Demonstration experiments are carried on in different localities.

Harper-Adams Agricultural College, Newport Salop.

Staff.—P. Hedworth Foulkes, B. S., *Prin.;* T. W. Fagan, M. A., *Chem.;* R. E. C. Burder, *Surveying;* G. T. Malthouse, *Bot. and Hort.;* W. T. Wilson, *Vet. Sci.;* J. C. Rushton, *Agr.;* W. Vaughan, *Agr. and Farm Steward;* C. D. Stewart, *Dairying.*

Origin.—Founded under the will of T. Harper-Adams in April, 1901, and at the outset was supported by a substantial grant from the Shropshire County Council.

Equipment.—Chemical and physical laboratories, lecture rooms, etc.; farm of 180 acres, with a dairy, carpenter shop, and forge, and machinery driven by steam; land being developed as a garden and as a horticultural and fruit growing station.

Income.—For 1902–3, $14,215.53 (Board of Agriculture and Fisheries, $1,459.50; county councils, $6,587.21; fees, $851.38; miscellaneous, $1,294.09; from endowment, $4,023.35).

Lines of work.—Dairy work and demonstration experiments with field crops.

Botanical Department, Royal Agricultural Society, Norwood.

Governing board.—Botanical committee of the Royal Agricultural Society.

Station staff.—William Carruthers, *Consulting Bot.*

Income.—The department exacts fees for botanical investigations.

Lines of work.—Seed control and botanical investigations for members of the society; investigation of plant diseases, of poisonous plants, and of suitable plants for hay and pasture.

University Botanic Garden, Oxford, England.[a]

Prof. S. H. Vines.

Cumberland and Westmoreland Farm School, Newton Rigg, Penrith.

Staff.—W. T. Lawrence, *Agr. and Farm Mgr.;* Miss K. M. Armstrong, *Dairying and Poultry Management.*

Origin.—Established in 1896 by the joint efforts of the Cumberland and Westmoreland County Councils. The place was originally rented, but has since been purchased, and large sums of money have been expended in improving it.

Equipment.—Farmhouse with a dairy containing butter-making, cheese-making, and ripening rooms; farm of nearly 120 acres; herd of dairy Shorthorns; fruit station; meteorological station.

Income.—For 1902–3, $9,730 (Board of Agriculture and Fisheries, $486.50; county councils, $5,108.25; farm products, $3,673.08; fees, $462.18).

Lines of work.—Field experiments, chiefly with hay, swedes, mangels, and potatoes; dairy work, and fruit growing; feeding experiments with sheep.

University College (Agricultural Department), Reading.

Staff.—John Percival, M. A., *Dir. Agr. Dept. and Agr. Bot.;* Frederick Keeble, M. A., *Dir. Hort. Dept. and Lect. in Bot.;* lecturers in agriculture, dairying, bacteriology, surveying, aviculture, veterinary hygiene, and apiculture.

Origin.—Founded in 1892. The college is affiliated with the University of Oxford, and works in cooperation with the counties of Berkshire, Buckinghamshire, Dorset, Hampshire, and Oxfordshire.

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[a] See Royal Gardens, Kew, p. 161.

Equipment.—College buildings with well-equipped botanical, chemical, zoological, and physical laboratories; a poultry farm at Theale, six miles from Reading, and a horticultural garden in London Road, Reading.

Income.—For 1902–3, $14,619.33 (Board of Agriculture and Fisheries, $3,892; county councils and Irish Department of Agriculture, $5,273.66; fees, $4,855.27; miscellaneous, $598.40).

Lines of work.—Demonstration experiments in seeding and manuring pastures, in growing varieties of barley, sugar beets, maize, and in manuring potatoes, oats, mangels, and barley.

Agricultural College, Uckfield.

Staff.—S. A. Woodhead, B. S., *Prin., Chem., Phys., and Geol.;* W. Southworth, *Agr., Bot., Ent.;* A. H. J. Haines, *Surveying and Estate Management;* W. Goring, *Hort.;* G. W. Bloxsome, *Vet.;* S. C. Sharpe, *Poultry Farming;* Mrs. Noakes, *Dairying;* W. Noakes, *Farm Foreman.*

Origin.—Founded by the East Sussex County Council in 1894 and maintained by that body.

Equipment.—Lecture rooms and chemical laboratory; farm of 100 acres with a small dairy; herd of Jerseys and flock of Southdown sheep, as well as fowls of a number of different breeds, and a garden of 4½ acres devoted to the growing of fruit and vegetables.

Income.—For 1902–3, $21,162.75 (Board of Agriculture and Fisheries, $973; East Sussex County Council, $13,388.48; fees, $2,160.06; sales of produce, $4,641.21).

Lines of work.—Dairy work, poultry management, and growing fruit and vegetables.

Woburn Experimental Fruit Farm, Woburn.

Governing board.—Eleventh Duke of Bedford and the director.

Station staff.—Spencer Pickering, *Dir.;*[a] a resident manager and seven or eight men and boys.

Origin.—Founded in 1894 by the Duke of Bedford, in conjunction with Spencer Pickering, in whose hands the whole organization, both practical and scientific, has been left.

Equipment.—Manager's residence and office, storeroom for fruit, greenhouse, garden house, sheds, and 20 acres in fruit.

Income.—All funds are furnished by the Duke of Bedford.

Lines of work.—Experiments with large and small fruits to determine best varieties, best methods of treatment as to distance apart in planting, cultivation, pruning, etc., and to determine means of combating diseases and insect pests.

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[a] Director's address, *Harpenden, Hertz.*

Southeastern Agricultural College, Wye.

Governing board.—Representatives of counties of Kent and Surrey, universities of Oxford, Cambridge, and London, and agricultural assistants.

Staff.—M. J. R. Dunstan, *Prin. and Chem.;* T. J. Young, *Vice-Prin.; Lect. in Agr.;* E. J. Russell, D. S., *Lect. in Chem.;* F. V. Theobald, M. A., *Ent.;* T. W. Cave, *Vet.;* A. Howard, *Bot.;* F. J. Plymen, *Soil Analyst;* J. F. Cocks, *Surveying, Construction, etc.;* T. R. Robinson, *Poultry Keeping and Dairying;* K. J. J. Mackenzie, *Agr. and Mgr. of Expts.;* F. T. Holbrook, *Demonstrator in Chem.;* S. Deadman, *Hort.;* W. Wardley, *Farriery;* J. Garratt, *Beekeeping;* J. Barrows, *Farm Bailiff;* H. W. Kersey, *Sec.*

Origin.—Founded by county councils of Kent and Surrey in 1894.

Equipment.—Well-equipped chemical, botanical, and veterinary laboratories; farm; hop garden; orchards; experimental plats in different localities; fruit station.

Income.—For 1902–3; $59,382.20 (Board of Agriculture and Fisheries, $5,268.80; county councils, $32,532.25; fees, $13,840.93; miscellaneous, $267.58; farm receipts, $7,472.64).

Lines of work.—Cultural, fertilizer, and spraying experiments with hops and orchard fruits; plat experiments with wheat, fodder corn, mangolds, and potatoes; soil survey of Kent and Surrey; feeding and breeding experiments with sheep; diseases of sheep. Demonstration experiments are carried on in different localities.

HUNGARY.

Ministry of Agriculture, Budapest.

Dr. Ignatius Darányi, *Minis. of Agr.*

The Hungarian Ministry of Agriculture was organized as a separate department in 1889. It includes an administrative division and seven scientific sections, the latter comprising twenty-five divisions. The ministry is located at Budapest in magnificent buildings surrounded by beautiful grounds. In the laboratories of these buildings a large force of specialists is engaged in research work. The ministry has an agricultural library of about 60,000 volumes, one of the largest in Europe.

Experiment stations in Hungary are government institutions designed to promote the advancement of agriculture by means of practical experiments, original research, and advice to farmers on various agricultural questions. In addition the chemical and seed control stations are called upon to examine agricultural supplies and agricultural products. The Central Commission of Experiment Stations exercises a directing and supervisory power over the individual stations, and acts as the representative of the Minister of Agriculture

in matters relating to the organization and work of the stations. The commission consists of a president (József Kazy), secretary (Rezsö Károly), and about a dozen permanent members, all appointed by the Minister of Agriculture. In this commission each branch of experiment station work is represented by a station director, the remaining members being prominent specialists in particular branches of agriculture. Since its creation in 1898 the commission has published a journal, *Kisérletügyi közlemények*, embodying the reports of the work of the various stations.

Entomological Station, Budapest.

Governing board.—Central Commission of Experiment Stations.

Station staff.—Jozsef Jablonovsky, *Dir.;* István Pásztor, *V.-Dir.;* J. Losy and G. Bakó, *Assts. Ent.;* two copyists; permanent correspondents in different parts of the country.

Origin.—Established in 1880.

Equipment.—The entomological station has quarters in the new laboratory building erected for the joint use of this station and the Royal Chemical Experiment Station. The quarters occupied by the entomological station include a large laboratory, six workrooms, two collection rooms, an insectary, a dark room, an office, and a library.

Income.—For 1902, $11,874 derived from endowment, fees, sale of publications, and miscellaneous sources.

Lines of work.—Study of the life histories of the common injurious insects in order to ascertain the best means for their destruction; repression of injurious mammals; the furnishing of information to the public on all matters relating to protection against injurious insects through the publication of popular bulletins.

Station for Animal Physiology and Nutrition, Budapest.

Governing board.—Central Commission of Experiment Stations.

Station staff.———— ————, *Dir.;* Dr. S. Weiser, *Chem.;* Dr. A. Zaitschek, *Chem.;* Z. Wimmer, *Asst. Vet.*

Origin.—Established in 1896 by the Ministry of Agriculture.

Equipment.—Laboratories equipped with everything necessary for physiological experiments and the analysis of feeding stuffs, feces, and urine; stables provided with scales for weighing the animals; and Berthelot-Mahler calorimeters. A respiration calorimeter for large animals is being constructed.

Income.—For 1901, $2,842 from the State.

Lines of work.—Study of the rational feeding of domestic animals, giving especial attention to feeding stuffs produced or manufactured in Hungary, and animals raised there. Experiments have been conducted with horses, swine, sheep, and poultry.

Central Seed Control Institution, Budapest.

Governing board.—Central Commission of Experiment Stations.

Station staff.—Dr. Árpád Degen, *Dir.;* L. Thaisz, O. Schmidt, and G. Tordai, *Assts.;* one microscopist; four helpers; in the winter several additional helpers.

Origin.—Established in 1882 in connection with the Veterinary Institute; made independent in 1891. There are seed control stations at Magyar-Óvár (Ungarisch-Altenburg) (Prof. G. Linhart, *Dir.*), Debreczen (Árpád Juhász, *Dir.*), Kassa (Emerich v. Budahary, *Dir.*), Keszthely (Béla v. Czakó, *Dir.*), and Kolosvár (Béla Páter, *Dir.*). The station at Magyar-Óvár was established in 1878. The others began work in 1884.

Equipment.—Each station possesses a standard collection of seeds of cultivated plants and weeds, a library, analytical and volumetric balances, a set of optical instruments, thermostat, farinometer, and a collection of feeding stuffs.

Lines of work.—Seed testing to safeguard farmers, horticulturists, and others against impurities, and to determine the maturity and germinative power of seeds; the dissemination of information regarding protection against weeds and plant parasites and regarding good apparatus for purifying seeds; botanical analysis of different kinds of hay and other feeding stuffs.

Royal Chemical Experiment Station, Budapest.

Governing board.—Central Commission of Experiment Stations.

Station staff.—Prof. Thos. Kosutány, *Dir.;* Gyula Toth, *V.-Dir.;* Zsigmond Kiticsán, *Chem.;* Lajos Kramszky, *Chem.;* S. Székely, Dr. F. Konek, Dr. F. Lutz, E. Lossonczy, Dr. A. D. Herczfelder, and Dr. K. Hartl, *Assts. Chem.;* a number of laboratory assistants.

Origin.—Established in 1881 in connection with the Veterinary Institute; made independent in 1887 and removed to the department building; reorganized in 1892.

Lines of work.—Control and inspection work in executing the law against adulteration of agricultural and other industrial products; examination of imported and exported wines and of exported sugars; the furnishing of expert information to the Government on chemical questions relating to commerce, finance, and customs. The scientific work of the station includes the elaboration of new methods of chemical analysis and the testing of methods recommended by others. Methods adopted by this station must be employed by all the other chemical stations. The station staff has adopted new methods for the analysis of milk, wine, whisky, meat, red pepper, soils, feeding stuffs, fertilizers, petroleum, and a large number of other commercial articles, and has made numerous analyses of agricultural plants, feeding

stuffs, factory refuse, musts, and wines of Hungary. It has also devoted much attention to research work in physiological chemistry.

Experiment Station for Tobacco Culture, Debreczen.

Governing board.—Central Commission of Experiment Stations.

Station staff.—Prof. Kálmán Kérpely, *Dir.;* E. Töräk and M. Liebhart, *Assts.;* foreman; four gardeners.

Origin.—Established in 1898 by the Ministry of Agriculture.

Equipment.—A main building containing laboratory, 7 curing barns representing different types, appliances for the Macedonian air-cure processes, 2 storage houses, 6 cabins for gardeners, and about 29 acres of land belonging to the Agricultural Institute. Of this area the buildings occupy about 7 acres, the hotbeds 1.4 acres, a botanic garden 2.9 acres, and a field for culture experiments about 14.5 acres.

Lines of work.—Investigations and experiments to ascertain the best methods of cultivating and curing tobacco, and variety tests and experiments having for their purpose the improvement of the quality of the leaf. The station trains workmen and officials for the administration of the Government tobacco monopoly and supplies tobacco growers with information and instruction as to rational culture. In order to conduct experiments simultaneously on the two most typical Hungarian soils, a substation has been established at Békés-Csaba (Odön Kallay, *Dir.*), which is under the control of the station at Debreczen. The soil at the main station is sandy, while that at the substation is black and compact. The area under cultivation at the substation is about 9 acres. Many cooperative experiments are carried out in different parts of the country.

Royal Hungarian Chemical Experiment Station, Debreczen.

Governing board.—Central Commission of Experiment Stations.

Station staff.—Dr. L. v. Széll, *Dir.;* K. Lányi and E. Mayer, *Assts.*

Origin.—Founded in 1894 in connection with the Hungarian Agricultural College of Debreczen.

Equipment.—A large laboratory equipped with an electric motor and other necessary apparatus; a balance room; stock room; a room for apparatus, including a large distillery; a library; a reading room; a lecture room, and a cellar.

Income.—For 1901, $1,967.20 (State, $1,232; endowment, $360; fees, $120; miscellaneous, $255.20).

Lines of work.—Chemical investigations, mainly with tobaccos and alkali soils; analysis and control of agricultural and technical products. This station cooperates with the Experiment Station for Tobacco Culture in the investigations on tobacco.

Seed Control Station, Debreczen.

Station staff.—Árpád Juhász, *Dir.*
Origin.—Established in 1884.

Royal Hungarian Chemical Station, Fiume.

Governing board.—Central Commission of Experiment Stations.
Station staff.—Dr. Alois Könyöki, *Dir.*
Origin.—Established in 1900.
Equipment.—A laboratory equipped for four chemists.
Income.—For 1901, $219.24 (State, $178.64; fees, $40.60).
Lines of work.—The analysis of wines and other products imported through this seaport; agricultural chemical investigations.

Chemical Experiment Station, Kassa.

Governing board.—Central Commission of Experiment Stations.
Station staff.—Prof. Zsigmond Zalka, *Dir.;* assistant.
Origin.—Established in 1884 as a department of the Agricultural Institute at Kassa.
Equipment.—Experimental distillery.
Lines of work.—The scientific work of the station is mainly devoted to investigations in its experimental distillery.

Experiment Station for the Distilling Industry, Kassa.

Station staff.—Prof. Zsigmond Zalka, *Dir.*
Origin.—Founded in 1900.

Seed Control Station, Kassa.

Station staff.—Prof. Emerich v. Budahary, *Dir.*
Origin.—Established in 1884.

Chemical Experiment Station, Keszthely.

Governing board.—Central Commission of Experiment Stations.
Station staff.—Prof. R. Windisch, *Dir.*
Origin.—Founded in 1885 in connection with the Agricultural Institute of Keszthely.
Lines of work.—Investigation of the plants cultivated in Hungary with reference to their physiology and need for fertilizers.

Seed Control Station, Keszthely.

Station staff.—Prof. Béla von Czakó, *Dir.*
Origin.—Established in 1884.

Chemical Experiment Station, Kolosvar (Klausenburg).

Governing board.—Central Commission of Experiment Stations.

Station staff.—Professor Fabinyi, *Dir.;* H. G. Donáth, *Asst.*

Origin.—Founded in 1897 as a department of the University of Klausenburg.

Lines of work.—Almost exclusively chemical control work.

Seed Control Station, Kolosvar (Klausenburg).

Station staff.—Prof. Béla Páter, *Dir.*

Origin.—Established in 1884.

Plant Culture Experiment Station, Magyar-Óvár (Ungarisch-Altenburg).

Governing board.—Central Commission of Experiment Stations, and the Director.

Station staff.—Prof. A. Cserháti, *Dir.;* J. Gyárfás, E. Grabner, H. Krolopp, Eu. von Hankóczy, *Agr.;* Dr. A. von Sigmond, J. Adorján, Eu. Márkus, *Chems.*

Origin.—Founded in 1891 as a station for testing varieties. In 1894 fertilizer experiments were undertaken, and in 1897–1899 pot-culture experiments and investigations of scientific problems were taken up.

Equipment.—A main building containing apartments and workroom for the director, three laboratories well equipped for chemical and mechanical analyses, two large workrooms, a library and balance room, a machine room, etc.; two vegetation houses, with equipment for pot experiments, and a storehouse for crops. In addition to the pots used in the vegetation houses, of which there are 1,200, the station is equipped with 610 cylinders sunk in earth, 30 Kühn-Wohltmann vegetation cases, and 60 large vegetation cases.

Income.—An annual appropriation of $8,323 from the Government.

Lines of work.—One division of the station has charge of cooperative experiments with farmers in different parts of the country, which are carried on for the purpose of testing varieties of farm crops and fertilizers; also of experimental investigations, such as the selection of sugar-beet seed and of wheat. The other division is occupied with the more scientific questions, such as investigations and experiments with soils, fertilizers, and other problems of plant nutrition. Since 1901 the station has had charge of the studies with alkali soils and their improvement in relation to the production of wheat.

Experiment Station for Agricultural Implements, Magyar-Óvár (Ungarisch-Altenburg).

Governing board.—Central Commission of Experiment Stations.

Station staff.—Prof. V. Thallmayer, *Dir.* The station is not an independent institution, and consequently has no separate staff. The

professor of agricultural machinery is, as a rule, intrusted with the management of the station and receives extra compensation, amounting to $120 a year.

Origin.—Established in 1869 in connection with the Agricultural Academy at Magyar-Óvár.

Equipment.—Dynamometers, indicators, and other instruments of precision necessary for measuring mechanical units. The station has no laboratories or other equipment separate from the Agricultural Academy. Machines sent in for trial are tested on the academy farm or on other estates.

Income.—An appropriation from the Royal Ministry of Agriculture, varying from $120 to $360 a year.

Lines of work.—The testing of newly invented agricultural machines and implements or those already in use to determine their fitness for the operations for which they are designed; the giving of detailed information to the agricultural population on all questions relating to agricultural machinery in actual use. On an average eight to ten machines and models are sent to the station annually, usually by inventors.

Public Station for Seed Control and Plant Physiology and Pathology, Magyar-Óvár (Ungarisch-Altenburg).

Governing board.—Central Commission of Experiment Stations.

Station staff.—Prof. G. Linhart, *Dir.;* Dezsö Hegyi and Rezsö Francé, *Assts.*

Origin.—In 1897 the chief of the Seed Control Station at Magyar-Óvár organized a station for plant physiology and pathology, and later the two stations received the official name of Public Station for Seed Control and Plant Physiology and Pathology. Both stations are under the management of one director.

Equipment.—A main building, containing the working office of the director; a large room for the examination of seeds; mycological and bacteriological laboratories; a greenhouse for germination experiments; collection of diseased plants and seeds; photographic apparatus, and a garden containing about 2 acres.

Lines of work.—The station examines diseased plants sent in by agriculturists, horticulturists, viticulturists, and sylviculturists, furnishes a description of the disease, and gives instruction for defense against it. The station also conducts investigations on the nature and cause of plant diseases and exercises seed control.

Chemical Experiment Station, Magyar-Óvár (Ungarisch-Altenburg).

Governing board.—Central Commission of Experiment Stations.

Station staff.—Prof. Jos. Nuriczán, *Dir.;* A. Faltin and Dr. K. Griell, *Assts.*

Origin.—This station, founded in 1872, is the oldest chemical station in Hungary, and is connected with the Agricultural Academy at Magyar-Óvár.

Lines of work.—Study of the chemistry of wine and of methods of wine examination; investigations of yeasts and their influence on fermentation, of the development and chemical composition of tobacco, and of the chemistry of oil cakes and certain agricultural plants; analysis of fertilizers and soils; study of vegetable albumin and the influences which affect the biological functions of plants.

Dairy Experiment Station, Magyar-Óvár (Ungarisch-Altenburg).

Station staff.—Prof. Emerich Ghelyi, *Dir.*

Origin.—Established in 1903.

Chemical Experiment Station, Pozsony (Pressburg).

Governing board.—Central Commission of Experiment Stations.

Station staff.— ——— ———, *Dir.*

Origin.—Founded in 1883 in connection with the Technical High School of Pozsony.

Lines of work.—Control work only.

Central Station of Forestry, Selmeczbanya.

Established in 1898 for forestry experiments

INDIA.

Taj and Other Government Gardens and Park, Agra, United Provinces of Agra and Oudh.[a]

Governing board.—The Superintendent, the Commissioner and Collector of the District, and Under Director of Land Records and Agriculture of the Provinces.

Staff.—A. E. P. Griessen, *Supt.;* two assistants.

Origin.—The institutions included under this organization include four horticultural gardens, a forestry establishment, a grass farm, two nurseries, and a park. All of these, except the nurseries and park started in 1900, were established during the existence of the Mogul Empire.

Equipment.—A large conservatory, erected in 1900; a large glass propagating house, erected in 1900; rooms for starting and germinating seeds; office, workshops, etc.

Income.—For 1901, $1,296.

Lines of work.—Horticultural investigations, acclimatization of plants, and landscape gardening.

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[a] See Royal Gardens, Kew, p. 161.

Government Gardens, Allahabad, United Provinces of Agra and Oudh.[a]

Governing board.—Commissioner of Allahabad and Collector and Magistrate, Allahabad.

Station staff.—H. J. Davies, *Supt.*

Equipment.—Plant houses and nurseries.

Income.—For 1901, $3,818.66 (government grant, $2,522.66; sale of garden products, $1,296).

Lines of work.—Experiments with fruit trees, flowers, and economic plants; sale and distribution of fruit and ornamental trees and trees for planting on public roads.

Botanic Gardens, Bangalore, Mysore.[a]

Staff.—J. Cameron, *Supt.*, assisted by two native curators, several clerks and helpers.

Origin.—These gardens came under control of an Agri-Horticultural Society in 1836, but upon the dissolution of the society in 1842 the property came into the hands of the government and has remained in its possession until the present time.

Equipment.—An exhibition house and botanic gardens covering about 100 acres.

Income.—The gardens are maintained by the government of Mysore.

Lines of work.—The culture and acclimatization of economic and ornamental plants and other flowers.

Botanic Garden, Baroda, Native States.[a]

G. H. Krumbiegel, *Supt.*

Municipal Gardens, Bombay, Bombay Presidency.[a]

Governing board.—The Bombay Municipality, with the Municipal Commissioner as the executive chief officer.

Staff.—Cavasji D. Mahaluxmivala, *Supt.;* J. M. Doctor, *Asst. Supt. of Zool. Collection;* one overseer; two clerks.

Origin.—The gardens included under the superintendency of C. D. Mahaluxmivala include the Victoria Gardens and seven other gardens, all but the first being pleasure grounds. The grant for the Victoria Gardens was acquired by the Agri-Horticultural Society of Western India in 1835, and in 1842 the garden was established with the aid of several government grants. It was not until 1862, however, that they were formally open to the public. In 1866 the Bombay Municipality became responsible for the maintenance of gardens, and in 1873, after the dissolution of the Agri-Horticultural Society, the whole responsibility of management and maintenance of the gardens was assumed by the municipality.

Equipment.—A museum building and botanic gardens.

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[a] See Royal Gardens, Kew, p. 161.

Income.—For 1902–3, $14,714.14 from the municipality.

Lines of work.—Maintained as a public pleasure garden and zoological garden.

Government Cinchona Plantations, British Sikkim, Bengal.[a]

Governing board.—In charge of the Superintendent of Royal Botanic Garden, Calcutta, Dr. David Prain, who is also quinologist of the colony.

Staff.—R. Pantling, *Dept. Supt.;* four assistants.

Origin.—Established by the government of Bengal in 1862.

Lines of work.—The cultivation of cinnamon and the manufacture of quinine for the use of government institutions.

Agri-Horticultural Society of India, Calcutta, Bengal.[a]

Governing board.—The president and council of the society, elected by members.

Staff.—P. Lancaster, *Sec. and Treas.;* A. J. B. Gisseleire, *Head Gard.;* C. E. James, *Asst.;* three native assistants.

Origin.—Founded in 1820 by the late Rev. W. Carey, D. D.

Equipment.—Two glass houses and ten plant houses.

Income.—For 1901, $27,540 (subscriptions from members, $4,860; government endowment, $1,944; other sources, $20,736).

Lines of work.—The promotion and improvement of agriculture and horticulture in India.

Botanic Gardens, Cawnpore, United Provinces of Agra and Oudh.[a]

Norman Gill, *Supt.*

Chittagong Farm, Chittagong, Bengal.

Income.—For 1903–4, $3,260 from the sale of farm products.

Lines of work.—Experiments with varieties of sugar cane, rice, hemp, maize, cotton, cereals, and garden vegetables.

Agricultural Farm, Cuttack, Bengal.

This farm was started in 1904 to carry out the suggestions of the Indian Irrigation Commission.

Maharajah's Garden, Darbhangah, Bengal.[a]

Herbert Thorn, *Supt.*

Lloyd Botanic Garden, Darjeeling, Bengal.[a]

Staff.—G. H. Cave, *Cur.;* one superintendent (nonresident).

Origin.—Founded in 1878.

Income.—1903–4, $2,073.60.

Lines of work.—An ordinary subtropical and temperate botanic garden, making a specialty of the local Himalayan flora.

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[a] See Royal Gardens, Kew, p. 161.

Dumraon Experimental Farm, Dumraon, Bengal.

Governing board.—Department of Land Records and Agriculture, Bengal. C. G. H. Allen, *Dir.;* D. N. Mukerji, M. A., *Asst. Dir.*, *Calcutta.*

Staff.—Experiments at this place are under the supervision of D. N. Mukerji, who also supervises work at other places in Bengal. The farm is in immediate charge of R. L. Banryu.

Origin.—Experiments were begun in 1885 on a farm at Pareswana. In 1895 this farm was given over to ordinary cultivation, and a new site for experimental work was chosen near Dumraon.

Equipment.—Farm buildings and farm of 30.75 acres, of which 22 acres are under cultivation.

Income.—Budget for 1902, $600.

Lines of work.—Manurial experiments with rice, wheat, sugar cane, potatoes, and wheat; variety tests; cross fertilization and culture experiments; trial of new farm implements, and distribution of seeds.

Cawnpore Experiment Farm, Gotaiya, United Provinces of Agra and Oudh.

Governing board.—Department of Land Records and Agriculture, United Provinces of Agra and Oudh. W. H. Moreland, *Dir.;* J. M. Hayman, *Deputy Dir.;* Saiyid Muhamad Hadi, *Asst. Dir.*, *Cawnpore.*

Staff.—Farm superintendent, farm bailiff, three apprentices, a veterinary assistant, a supervisor of wells, and a superintendent of workshop and seed store.

Origin.—Established in 1881.

Equipment.—Farm buildings, seed store, workshops for the manufacture of agricultural implements, veterinary hospital, a farm of 51.33 acres, of which 36.34 are under cultivation.

Income.—A government grant averaging about $5,500 a year and receipts from the sale of farm products, etc., about $2,346.

Lines of work.—Nitrogen investigations similar to those at Rothamsted, combined with field experiments with various rotation and green manures; experiments with different manures; variety tests with potatoes, sugar cane, cotton, and other crops; testing and distributing farm implements; supplying of tools to landowners for taking trial borings prior to sinking wells; distribution of seeds; cattle breeding for landowners; treatment of diseases of domestic animals. Permanent manurial experiments have been conducted since 1881, and since 1883 52 plats have been devoted to this series of experiments. Publications are issued both in English and in the vernacular of the provinces.

Botanic Garden, Gwalior, Native States. [a]

C. Maries, *Supt.*

[a] See Royal Gardens, Kew, p. 161.

Sripur Farm, Hathwa Raj District, Bengal.

Origin.—Established in 1900.

Staff.—N. N. Banerji, *Dir.*

Lines of work.—Experiments in connection with cattle breeding; field experiments with maize, sugar cane, potatoes, sweet potatoes, and other farm crops; tests of silage.

Municipal Garden, Karachi, Bombay Presidency. [a]

Botanic Garden, Kumaon (Ramghur), United Provinces of Agra and Oudh. [a]

F. W. Seers, *Supt.*

Botanic Garden, Lahore, Punjab. [a]

H. G. Hein, *Supt.*

Government Horticultural Gardens, Lucknow, United Provinces of Agra and Oudh. [a]

Governing board.—Department of Land Records and Agriculture, United Provinces of Agra and Oudh. W. H. Moreland, *Dir.*, *Cawnpore.*

Staff.—Matthew Ridley, *Supt.*

Equipment.—Horticultural gardens, arboricultural nursery, and exotic and date plantations.

Income.—The gardens are self-supporting, and the expenditures for 1901–2 amounted to $5,675.18.

Lines of work.—Commercial propagation of fruits, vegetables, and flowers, and in connection with this work experimental investigations. Annual reports have been published since 1888.

Department of Agriculture, Madras.

Staff.—C. Benson, *Deputy Dir., Agricultural branch;* C. K. Subba Rao. *Sub-Asst. Dir. of Agr.;* C. A. Barber, *Govt. Bot.;* N. Venkatakrishnama Nayadu, *1st Asst.*, and C. Tadulingam Moodaliar, *2d Asst.*

Origin.—There are stations at Bellary, Koilpatti, and Samalkot, each in charge of an inspector, which were started in 1901 by the government of Madras.

Equipment.—The Bellary station has 61 acres, of which 13 acres have been laid out purely for experimental purposes. The Koilpatti station has 49 acres, of which 8 acres are being laid out for continuous experiment work. These have been permanently acquired and are equipped with the necessary buildings and farming stock. The Samalkot station is leased as a temporary measure and has an area of 12½ acres.

Income.—The government makes a grant of from $3,888 to $4,860 for the support of the stations besides providing salaries for the permanent staff.

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[a] See Royal Gardens, Kew, p. 161.

Lines of work.—These farms were established primarily for the investigation of problems of practical agriculture, with special reference to the best methods of utilizing scanty rainfall and of economizing manure. Tests of crop varieties and seed selection receive attention. At Samalkot the station is devoted specially to the investigation of diseases of the sugar cane and a discovery, if possible, of immune varieties. Some experiments with varieties of rice are also in progress there.

Agri-Horticultural Society, Madras, Madras Presidency.[a]

A. G. Bourne, *Honorary Sec.*

Botanic Garden, Morvi, Native States.[a]

Joseph Beck, *Supt.*

Department of Agricultural Chemistry, Mysore, Mysore.

Governing board.—Directly under the government of the State, which is composed of His Highness the Maharajah, the Dewan, and two councillors.

Station staff.—Dr. A. Lehmann, *Chem.;* H. V. Krishnayya, B. Venkata Rao, A. K. Yegna Narayana Iyer, *Assts. Chem.;* Krishnasami Iyer, Mariswamy, *Agr. Insps.;* Ramachandra Rao, *Asst. in charge of Plat Expts.*

Origin.—Founded in 1899 by the government appointing an agricultural chemist.

Equipment.—A laboratory building, completed in 1902 at a cost of $19,700, containing three laboratories, combustion room, assaying room, a balance room, three offices, apparatus room, preparation room, and museum, and a field for plat experiments.

Income.—For 1902, $10,445 from State funds.

Lines of work.—General agricultural questions on tropical agriculture, bureau of information on agriculture, the chemical work of the geological department.

Government Experimental Farm, Nagpur, Central Provinces.

Governing board.—Department of Agriculture, Central Provinces: F. G. Sly, *Dir. of Agr.;* R. S. Joshi, *Asst. Dir.*

Staff.—Bhaiya Lal Dubey, *Farm Supt.;* Jiya Lal Tiwari, Thundi Lal Powar, *Farm Overseers.*

Origin.—The main experiment farm was established in 1883. A second government farm was established at Telinkheri, a suburb of Nagpur, in 1899, and two others at Raipur and Hoshangabad in 1902.

Equipment.—At Nagpur: Farm buildings and a farm of 90 acres, of which 70 acres are under cultivation. In addition there is a sewage farm of 25 acres for dealing with a portion of the sewage of Nagpur

[a] See Royal Gardens, Kew, p. 161.

City. There is also connected with the farm an agricultural school, at which about 100 students receive instruction in elementary practical farming.

At Telinkheri: Farm buildings and a farm of about 400 acres, of which 75 acres are under cultivation, the remainder consisting of land devoted to the experimental growth of forest trees and grazing. A cattle farm, with 50 head of cattle for breeding purposes, has been established at the latter place. In addition there is a fuel and fodder reserve of 425 acres for experiments in reforestation.

Income.—At Nagpur: Farm income, $1,000; at Telinkheri, $700.

Lines of work.—Experiments with different manures on dry and wet crops; rotation and tillage experiments, with and without manures; experiments with mixed forage crops and new and improved varieties; investigation of plant diseases; selection of seed; plant-breeding experiments; trials of farm implements; cattle breeding; sewage, and reforestation experiments. Annual reports are published.

Horticultural Gardens, Nagpur, Central Provinces.[a]

Governing board.—Department of Agriculture, Central Provinces: F. G. Sly, *Dir. of Agr.;* R. S. Joshi, *Asst. Dir.*

Staff.—J. H. Stephen, *Supt. of Gardens at Nagpur and Telinkheri;* J. Safdar Ali, *Supt. of Pachmarhi Garden.*

Origin.—These gardens have been started from time to time by the government at Nagpur, Telinkheri, Pachmarhi, and other districts of the Central Provinces.

Income.—Total cost of these gardens in 1902 was $8,740, of which about $3,610 was derived from the operations of the gardens.

Lines of work.—Propagation and cultivation of tropical fruits, vegetables, and flowers; trial of new and improved varieties of garden crops; experiments in fruit and vegetable culture; distribution of plants and seeds. Annual reports are published.

Botanic Garden, Ootacumund, Madras Presidency.[a]

Staff.—R. L. Proudlock, *Cur.*

Origin.—Opened in 1847.

Equipment.—Botanic gardens of 51 acres.

Income.—For 1900, four thousand three hundred and sixty-eight dollars.

Lines of work.—Improvement of horticultural conditions in the district, introduction of vegetable productions not indigenous to India, and the distribution of plants and seeds.

Government Cinchona Plantations, Ootacumund, Madras Presidency.[a]

W. M. Standen, *Dir.*

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[a] See Royal Gardens, Kew, p. 161.

Burdwan Experimental Farm, Pala, Bengal.

Governing board.—Department of Land Records and Agriculture: C. G. H. Allen, *Dir.;* D. N. Mukerji, *Asst. Dir.*, *Calcutta.*

Staff.—The farm is under the supervision of D. N. Mukerji, who also supervises experimental work at other places. It is in immediate charge of an overseer, Babu Debi Prosad Chowbe.

Origin.—Established in 1885.

Equipment.—Farm of 31 acres, of which about one-half is devoted to experimental work.

Income.—Budget for 1902, $860. The farm is maintained at the expense of the Maharajah of Burdwan, a minor whose estate is now under the Court of Wards.

Lines of work.—Cultural and fertilizer experiments with rice, jute, sugar cane, maize, and potatoes; tests of tobacco.

Botanic Garden, Poona (Ghorpuri), Bombay Presidency.[a]

P. S. Kanetkar, *Supt.*

Botanic Department of the College of Science, Poona, Bombay Presidency.[a]

G. A. Gammie, *Dir.*

Government Experiment Farms, Kirkee and Manjri, near Poona, Bombay Presidency.

Governing board.—Department of Land Records and Agriculture, Bombay Presidency: H. S. Lawrence, *Dir.*

Staff.—P. R. Mehta, *Deputy Dir. of Agr.*

Origin.—Established in 1885.

Income.—Budget for 1902–3, $1,944.

Lines of work.—Kirkee Farm: Manure and rotation experiments with food and forage crops, oil seeds, tobacco, and other crops; improvement of wheat and cotton by selection and cross fertilization; dairy and feeding experiments; study of plant diseases and their remedies; botanical investigation of varieties of crops; trials of new farm implements. Manjri Farm: Special experiments with varieties of sugar cane and tests of different manures on the same; bacteriological experiments with city sewage and tests of its fertilizing value; irrigation experiments with canal and sewage water.

Experiment Station of the Imperial Agricultural College Pusa, Bengal.

Bernard Coventry, *Dir.*

This station is to be a part of an institution for agricultural education and research provided for by an endowment of $150,000 made by Henry Phipps.

The staff of the station is to consist of two chemists (one being also

[a] See Royal Gardens, Kew, p. 161.

a bacteriologist), two botanists (one cryptogamic and the other biological), and an entomologist.

In connection with the station there is to be an experiment farm, which is to serve as a model for similar institutions under provincial governments.

Botanic Gardens, Saháranpur, United Provinces of Agra and Oudh.[a]

William Gollan, *Supt.*

Saidápet Experimental Farm, Saidápet, Madras Presidency.

Governing board.—In charge of Hon. G. H. Stuart, M. A., *Dir. of Public Instruction.*

Staff.—W. Keess, M. A., *Supt.;* R. S. Thorne, *Asst.*

Origin.—Established in 1865; now maintained in connection with the Madras Agricultural College, which was established in 1876.

Equipment.—College buildings, barns, sheds, etc., botanic gardens, orchards, and experimental field.

Lines of work.—Experiments in green manuring, seed production and selection, acclimatization of plants, irrigation for "dry" crops and forage plants, rotation of crops, the use of fertilizers, and live-stock production. Considerable attention is given to the introduction of new and improved farm implements and machinery. Annual reports are published.

Sugar Cane Station, Samalkot, Godavari District.

Staff.—Conducted under the general direction of C. A. Barber, *Govt. Bot., Madras.*

Origin.—Established in 1902.

Lines of work.—Introduction of new and improved varieties of sugar cane, and experiments in planting and cultivating sugar cane for the purpose of increasing the yield, lessening the expense, and reducing the diseases to which this crop is subject.

Department of Royal Botanic Gardens, Sibpur, Bengal.[a]

D. Prain, *Supt.*

Experimental Farm of the Civil Engineering College, Sibpur, near Calcutta, Bengal.

Governing board.—Agricultural department of the Civil Engineering College.

Staff.—D. Datta, *Dir. and Agr.;* Rajnath Ray, *Farm.*

Origin.—The farm was established in 1887 and was maintained as an independent institution until 1899, when it was joined to the agricultural department of the Civil Engineering College.

Equipment.—Farm of 26 acres.

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[a] See Royal Gardens, Kew, p. 161.

Income.—For 1902–3 from all sources, $1,135.62 (farm receipts, $491.83).

Lines of work.—Experiments with manures, new crops, implements, machinery, insecticides, and methods of culture; and the distribution of seeds and implements.

Government Experiment Farm, Surat, Bombay Presidency.

Governing board.—Department of Land Records and Agriculture, Bombay Presidency: H. S. Lawrence, *Dir.*

Staff.—P. R. Mehta, *Deputy Dir. of Agr.*

Origin.—Established in 1896.

Income.—Budget for 1902–3, $1,620.

Lines of work.—Manure-rotation experiments with the staple crops of the district, improvement of seed by selection, experiments with forage crops, study of plant diseases and their remedies, improvement of cotton and wheat by crossbreeding, identification and botanical investigation of the numerous varieties of crops grown in the Presidency, introduction of new varieties of food and forage crops, trial of new agricultural implements, cattle breeding, and dairy experiments with improved dairy machinery.

Division of Experimental Cultivation, Taunggyi, Southern Shan States.

Staff.—Sir George Scott, *Supt.;* Maung Sè, *Gard.*

Experiments were begun in 1891 and consist of simple cultural experiments with farm crops, garden vegetables, and fruits. Probationers sent in by the native chiefs are trained in the orchard. The budget for 1902–3 was $1,378.94.

Museum and Botanic Gardens, Trivandrum, Travancore Native States.[a]

Governing board.—Government of His Highness the Maharajah of Travancore.

Station staff.—H. S. Ferguson, *Dir.*

Origin.—Museum opened in 1857. The Botanic Gardens were begun about the same time, but were not developed to any extent until in 1890.

Equipment.—Museum building, house and pens for animals, propagating house, fernery, superintendent's house, zoological collection of 275 specimens, and botanic garden of 40 acres.

Income.—Annual government grant of $6,240.

Lines of work.—Some attention is given to the cultivation of economic plants, but in the main the museum and gardens are kept up as places of recreation for the general public. Annual reports are published.

Botanic Garden, Udaipur, Native States.[a]

T. H. Storey, *Supt.*

[a] See Royal Gardens, Kew, p. 161.

ITALY.

Department of Agriculture, Industries, and Commerce, Rome.

Premier Zanardelli, *Actg. Minis.;* Professor Tito, *Chief Div. of Agr.*

In Italy, the Department of Agriculture, Industries, and Commerce comprises nine divisions, each of which is charged with the supervision of some particular phase of agricultural, industrial, or commercial activity. The fifth division, of which Professor Tito is chief, has charge of agricultural institutions for instruction and research, including colleges, schools, experiment stations, and laboratories. These institutions receive appropriations from the Government, and in many cases also from the province and the municipality in which they are located, and from local agricultural associations and chambers of commerce.

Experiment stations in Italy are either autonomous or connected with educational institutions; agricultural chemical laboratories are all connected with educational institutions. The administration of the station funds is in charge of the director, who must report to the Department of Agriculture and to a committee of administration composed of the director of the station and representatives of all the bodies associated in support of the station. The studies and investigations of each station are made in accordance with the plans of the station staff or at the request of the Department of Agriculture, of local corporations that contribute to the support of the station, or of public or private administrations. Fees are charged for analyses, but not for determinations of fungi, injurious insects, etc. Some of the stations give instruction to special students, and all give information freely to the public on the results of their investigations. In some cases lectures are given for the purpose of acquainting the people with these results.

Enological Station, Asti.

Governing board.—The station is autonomous and is controlled by a board composed of members appointed by the Department of Agriculture, Industries, and Commerce, the municipality of Asti, the citizens of the district, the savings bank of Asti, and the director.

Station staff.—Dr. Federico Martinotti, *Dir.;* Dr. Carlo Menzio, *Asst. Chem.;* Dr. Uldarico Semma, *Asst. Agr.*

Origin.—Founded in 1872 by royal decree.

Equipment.—Laboratory, wine cellar, and a room for agricultural and enological machinery.

Income.—For 1902, $3,860 (State, $1,833.50; city of Asti, $965; savings bank, $193; local subscriptions and fees, $868.50).

Lines of work.—Analysis of grapes, must, wines, adulterants, and vineyard soils; chemical and microscopical research work in fermen-

tation and in diseases of the vine and grape; experiments with fertilizers; investigations on the best methods of vinification and preservation of wine and examination of machinery and implements used for these purposes; cooperative work with grape growers; dissemination of information by means of published articles, correspondence, lectures, and conferences. Inspection and analytical work is done upon demand.

Entomological Station, 19 Via Romano, Florence.

Governing board.—Under the control of the Royal Institute for Higher Studies, with which the station is connected.

Station staff.— Prof. A. Berlese, *Dir.;* two assistants.

Origin.—Established by the Department of Agriculture, Industries, and Commerce in 1875; reorganized in 1887.

Equipment.—Laboratory building containing laboratories of comparative anatomy, bacteriology, zootechny, and chemistry; zoological and entomological collections, and a library.

Lines of work.—Investigations in economic entomology and zoology and in methods of combating insect pests of plants and animals. The results of the work are made public by correspondence, lectures, and the station publication, *Nuove relazioni intorno ai lavori della Reale Stazione di Entomologia Agraria di Firenze.*

Agricultural Chemical Experiment Station, Forli.

Governing board.—The station is connected with the Technical Institute at Forli, and is controlled by a committee composed of the director and four other members representing the Department of Agriculture, Industries, and Commerce; the Province of Forli, the municipality of Forli, and the local agricultural society.

Station staff.—Prof. Alessandro Pasqualini, *Dir.;* Antonio Sintoni, *Agr.;* Ugo Serughi, *Asst. Chem.;* Emilio Pizzigati, Vincenzo Giusti, *Helpers.*

Origin.—Established in 1872.

Equipment.—The laboratories and other equipment of the Technical Institute.

Lines of work.—Chemical investigation of fertilizers, soils, waters, agricultural products, and miscellaneous materials; cultural experiments with different fertilizers; enological and viticultural experiments; microscopic examination of the eggs of the silkworm; experiments with forage crops and fiber plants; and the dissemination of information by correspondence and lectures. The important work of the station is published in *Annali della Reale Stazione Agraria di Forli.*

Experiment Station for Cheese Making, Lodi.

Governing board.—The station is autonomous and is controlled by a committee of five members representing the Government and local associations.

Station staff.—Prof. Carlo Besana, *Dir.;* Gætano Cornalba and Giuseppi Fascetti, *Assts.*

Origin.—Established in 1871; reorganized in 1879.

Income.—For 1898, $2,509 (Government, $1,129.05; province of Milan, $1,003.60; municipalities of Lodi and Chiosi, $250.90; Lodi Chamber of Commerce, $125.45).

Lines of work.—Manufacture of cheese; investigation of the influence of temperature on milk and on the manufacture of butter and cheese; study of the influence of butter fat on the manufacture and keeping qualities of cheese; investigation of various starters, coloring materials, and methods of heating milk; study of milk and butter adulterants and means for preventing their use; testing dairy machinery; and the dissemination of information by lectures and correspondence. The work of the station is published in the *Annuario della Reale Stazione Sperimentale di Caseificio di Lodi.*

Agricultural Chemical Experiment Station, Milan.

Governing board.—The station is under the control of the Royal Agricultural High School.

Station staff.—Prof. A. Menozzi, *Dir.*

Origin.—Established in 1871 in connection with the Royal Agricultural High School; transferred in 1879 to the Veterinary High School; reorganized and brought under the control of the Royal Agricultural High School in 1891.

Equipment.—An agricultural chemical laboratory.

Lines of work.—Analysis of soils, fertilizers, and feeding stuffs; cultural experiments with different manures and fertilizers; feeding experiments; microscopic examination and test of eggs of the silkworm; and the dissemination of information by lectures and the station publication, *Ricerche eseguite nel Laboratorio di Chimica Agraria della Reale Scuola Superiore d' Agricoltura di Milano.*

Agricultural Chemical Experiment Station, Modena.

Governing board.—The station is autonomous and is controlled by a council made up of representatives of the Government, the province and the municipality of Modena, and the director.

Station staff.—Gino Cugini, *Dir.;* Prof. Pietro Maissen, Enrico Rossi, Dr. Eugenio Alberti, *Chems.;* Prof. Francesco Todaro, *Agr.;* Dr. Giulio D'Ippolito, *Bot.;* four to six student aids.

Origin.—Established in 1871; reorganized in 1879.

Equipment.—Chemical laboratory; botanical, bacteriological, and seed-testing laboratory, provided with all needed apparatus for research work; agricultural museum; library; collection of agricultural implements, and an experiment field.

Income.—For 1901–2, $8,549.44 (permanent endowment, $2,682.70; fees for chemical analyses, $5,162.36; fees for botanical analyses,

$248.10; subscriptions, $456.28 to *Le Stazioni Agrarie Sperimentali Italiane*).

Lines of work.—Physiological and pathological investigation of cereals and forage plants; introduction and acclimatization of new cereals and forage plants; seed control; analysis of fertilizers, soils, subsoil rocks, cereals and forage crops and their products, drinking water and irrigation water; microscopic examination of eggs of the silkworm; and the dissemination of information by the instruction of students in the laboratory by lectures and by published reports.

Sericultural Station, Padua.

Governing board.—Committee of six members representing the Government, province, commune, and local agricultural society.

Station staff.—Prof. Enrico Verson̄, *Dir.;* Prof. E. Quajat, *V.-Dir.;* one assistant; one secretary.

Origin.—Established in 1871.

Equipment.—School building; laboratories of chemistry and micrography; nursery for silkworms; a vegetation house; a museum; and a grove of mulberry trees.

Income.—For 1902, $3,860 (State, $2,895; fees, $965).

Lines of work.—The purpose of the station is primarily to give instruction in sericulture. The original investigations include the study of anatomy and biology of silkworms and the conditions essential for the successful production of silkworms, including laws of nutrition, means of treating diseases, etc.; preparation and distribution of healthy eggs of silkworms; experiments with new species of worms, and with new instruments used in silk production; and the investigation of any question that may arise in practical sericulture.

Agricultural Chemical Experiment Station, Palermo.

Governing board.—The station is autonomous and is controlled by a committee representing the Government and local societies.

Station staff.—Prof. A. Bornträger, *Dir.;* assistant chemist; assistant agriculturist.

Origin.—Established in 1872.

Lines of work.—Chemical and physiological analysis of soils; analysis of fertilizers, feeding stuffs, waters and agricultural products; feeding experiments; entomological investigations; experiments to determine the commercial value of sumac; enological experiments; and the dissemination of information by lectures and published reports.

Cryptogamic Laboratory, Pavia.

Governing board.—Under the control of the Botanic Institute of the University of Pavia.

Station staff.—Prof. Giovani Briosi, *Dir.;* one assistant; two student assistants.

Origin.—Established in 1871.

Equipment.—The laboratories and vegetation houses of the Botanic Institute.

Lines of work.—Study of the anatomy and physiology of plants and of the morphology of cryptogamic parasites of plants and animals; investigation of means for arresting their development and spread and for lessening their injurious effects; and the study of problems submitted by public or private parties. The results are published in *Atti dell' Istituto Botanico dell' Università di Pavia* and other periodicals.

Agricultural Chemical Laboratory, Pisa.

Governing board.—A trustee representing the Department of Agriculture, Industries, and Commerce.

Station staff.—Prof. Fausto Sestini, *Dir.;* Dr. C. Montanari, *V.-Dir.;* Dr. A. Martinoli, *Asst. Chem.;* Dr. G. Masoni, *Asst. Agr.*

Origin.—Established in 1886 by the Department of Agriculture, Industries, and Commerce.

Equipment.—The station is provided with a well-equipped agricultural chemical laboratory in the University of Pisa.

Income.—For 1901, $1,447.50 (State, $579; fees for analyses, $868.50).

Lines of work.—Studies in plant nutrition; analysis of soils, fertilizers, and feeding stuffs; analytical investigations; study of adulteration of olive oil; practical investigations for farmers. (See Agricultural Chemical Laboratories, p. 192.)

Royal Agricultural High School, Portici (Naples).

Governing board.—Department of Agriculture, Industries, and Commerce.

Station staff.—Prof. Salvatore Baldassarre, *Dir. Animal Husb.;* Prof. G. Ampola, *Dir. Agr. Chem. Lab.;* Prof. P. Palmeri, *Chem.;* Prof. F. Campanile, *Phys. and Met.;* Prof. E. Monaco, *Min. and Geol.;* Prof. O. Comes, *Bot. and Veg. Path.;* Prof. A. Berlese, *Zool. and Ent.;* Prof. M. Montanari, *Agr.;* Prof. L. Savastano, *Hort. and For.;* Prof. F. Nitti, *Polit. Econ., Statistics, and Rural Legislation;* Prof. O. Bordiga, *Rural Econ., Taxation, and Accounts;* Prof. F. Milone, *Farm Mach. and Rural Construction;* Prof. E. Galli, *Hydraulics, Topography, and Designing;* Prof. U. Barpi, *Anat. and Physiol.;* Prof. E. Mingioli, *Agr. Indus.;* Dr. G. Leonardi, *Apiculture and Silk Culture;* Dr. F. Rossi, *Enol.;* Dr. G. Mottareale, *Veg. Path.;* Dr. G. Martinoli, *Animal Path.*

Origin.—Established in 1872 by the Province of Naples, with the cooperation of the Department of Agriculture, Industries, and Commerce, which later, in 1889, assumed full control of the school.

Equipment.—In the main building of the school are a number of laboratories—botanical, chemical, zoological, entomological, etc.—a museum, and a nursery for silkworms. There are also experimental dairy barns and a botanic garden.

Income.—Funds provided by the Department of Agriculture, Industries, and Commerce and fees for analyses.

Lines of work.—This institution includes a number of departments that are engaged in investigations relating to agriculture. The agricultural chemical laboratory is similar to those connected with other educational institutions in Italy, its work comprising analyses and investigations with animal and vegetable products, soils, and fertilizers. Other departments are investigating problems in the nutrition and breeding of domestic animals, diseases of plants and animals, insect pests, silk production, dairy problems, and the production of field crops, especially tobacco. Entomological investigations have included quite extensive studies of scale insects and mites, investigations of insecticides, a study of the agency of insects in the transmission of alcoholic ferments, and an investigation of the effect of intraorganic injections on parasites. Doctor Leonardi has published a book on injurious Hymenoptera and Diptera. Reports of the investigations are published in *Annali della Reale Scuola Superiore d'Agricoltura in Portici* and bulletins are issued for free distribution.

Experiment Station for Vegetable Pathology, Rome.

Governing board.—The station is independent.

Station staff.—Prof. G. Cuboni, *Dir.;* two assistants.

Origin.—Established in 1887.

Lines of work.—Study of cryptogamic and bacteriological diseases of cultivated plants and of means for suppressing them; and the dissemination of information by lectures.

Agricultural Chemical Experiment Station, Rome.

Governing board.—The station is autonomous and under the control of the Department of Agriculture, Industries, and Commerce.

Station staff.—Prof. Italo Giglioli, *Dir.;* Drs. Amerigo Lazzari, Saverio Jovino, Matteo Tallamini, Giulio Saulnier, *Assts.*

Origin.—Established in 1871; reorganized in 1884.

Equipment.—In the building of the Royal Agricultural Museum of Rome this station is provided with two chemical laboratories, balance room, machine room, workshop, and an agricultural library of 6,000 volumes. Adjacent to the laboratory is an experiment field of about 1¼ acres. The experiment field, established at Suessola in 1887 and until 1901 connected with the agricultural chemical laboratory of the Royal Agricultural High School at Portici, is now under the management of this station.

Income.—For 1902–3, $5,230.30, including a government allowance of $3,570.50.

Lines of work.—Analysis of fertilizers, soils, feeding stuffs, plants, and plant products; field experiments on different soils with different manures and fertilizers, and the dissemination of information by bulletins, correspondence, and lectures. At Suessola continuous cropping with wheat and corn has been in progress for fifteen years, and during that time 15 crops of wheat and 14 crops of corn have been raised on one field.

Agricultural Chemical Laboratory, Scandicci (Florence).

Governing board.—Under the control of the Agricultural Institute of Scandicci, with which it is connected.

Station staff.—Prof. Napoleon Passerini, *Dir.*

Origin.—Founded in 1884 by Count N. Passerini.

Equipment.—Chemical laboratory and other equipment of the Agricultural Institute.

Lines of work.—Analysis of soils, fertilizers, animal and vegetable products, etc.; fertilizer experiments; investigations in plant physiology and problems in nitrifaction, germination of seeds, soil physics, wine production, and variety tests with tobacco. (See Agricultural Chemical Laboratories, p. 192.)

Agricultural Chemical Laboratory, Siena.

Station staff.—Prof. Carlo Giannetti, *Dir.;* an assistant and a helper.

Origin.—Established in 1872 by the Agricultural Society of Siena, with the concurrence of the Department of Agriculture, Industries, and Commerce, the latter to provide for the maintenance of the station. In 1887 it became autonomous.

Equipment.—The laboratory has no equipment but makes use of the spacious laboratories and excellent modern apparatus of the pharmaceutical chemical laboratory of the Royal University of Siena.

Income.—For 1902, $540.40 (Department of Agriculture, Industries, and Commerce, $386; municipality of Siena, $38.60; fees, $115.80).

Lines of work.—Analysis of foods, feeding stuffs, soils, wines, waters, etc. (See Agricultural Chemical Laboratories, p. 192.)

Agricultural Chemical Experiment Station, Turin.

Governing board.—The station is autonomous and under the control of a committee representing the Government and local societies.

Station staff.—Dr. M. Zecchini, *Dir.;* four assistants.

Origin.—Established in 1871.

Lines of work.—Analysis of soils, waters, and fertilizers; fertilizer experiments; study of rocks from which originated the Piedmont soils; and the dissemination of information by lectures and correspondence.

Agricultural Chemical Experiment Station, Udine.

Governing board.—Connected with the Technical Institute of Udine and governed by a committee representing the Government and local societies.

Station staff.—Prof. G. Nallino, *Dir.*

Origin.—Established in 1870.

Equipment.—The station has the use of the equipment of the Technical Institute.

Lines of work.—Analysis and experimental test of different soils and fertilizers, enological and viticultural experiments; microscopic examinations and tests of the vitality of eggs of the silkworm; and the dissemination of information by lectures and correspondence.

Agricultural Chemical Laboratories.

These are laboratories connected with educational institutions and are under the control, usually, of professors of chemistry. Partly supported by the institutions with which they are connected and by fees, each laboratory also receives an annual grant of $193 from the Department of Agriculture, Industries, and Commerce. The work undertaken includes the analysis of soils, fertilizers, animal and vegetable products, and other articles sent to the institution. Such work, when done for private parties, requires a small fee, but when done for government officials and agricultural societies is gratuitous.

Agricultural Chemical Laboratory, Bologna.

Established in 1872; Prof. G. Plancher, *Dir.*

Agricultural Chemical Laboratory, Caserta.

Established in 1888; Prof. E. Casoria, *Dir.*

Agricultural Chemical Laboratory, Perugia.

Prof. Gius. Bellucci, *Dir.*

Agricultural Chemical Laboratory, Pesaro.

Established in 1871; Dr. Francis Dupré, *Dir.*

Agricultural Chemical Laboratory, Pisa.[a]

Established in 1886; Prof. Fausto Sestini, *Dir.*

Agricultural Chemical Laboratory, Portici.[b]

Prof. G. Ampola, *Dir.*

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[a] See same laboratory, p. 189.

[b] See Royal Agricultural High School, Portici, p. 189.

Agricultural Chemical Laboratory, Scandicci.[a]

Prof. Napoleon Passerini, *Dir.*

Agricultural Chemical Laboratory, Siena.[a]

Established in 1872; Prof. Carlo Giannetti, *Dir.*

JAPAN.

The Ministry of Agriculture and Commerce, Tokyo.

Baron Keigo Kiyoura, *Minis. of Agr. and Com.*

From 1869 to 1881 there was in Japan the Bureau of Agriculture, which was successively attached to the ministries of state, finance, and the interior. In 1881 the Ministry of Agriculture and Commerce was organized as a separate department. It comprises bureaus of agriculture, commerce and industry, forestry, superintendence of forests and uncultivated areas, mines, patents, fisheries, and geology. The Bureau of Agriculture includes five divisions—administration, agricultural products, animal husbandry, horse breeding, and horse castration. The total budget of the ministry for 1902 was $3,386,713.

The ministry establishes, supports, and controls experiment stations; conducts special experiments in the manufacture of tea; investigates problems in sericulture, animal husbandry, horse breeding, veterinary science, etc.; erects new buildings and purchases apparatus for the experiment stations, sericultural schools, and other institutions under its control.

The experimental work of the ministry began in 1886 with field experiments with rice, wheat, and other crops in the vicinity of Tokyo. In 1890 a provincial experiment field was established at Nishigahara, and in 1893 this was enlarged and became the Central Agricultural Experiment Station. At the same time six branch stations were organized, three others being organized in 1896. These branch stations were organized for the purpose of conducting work somewhat similar to that done at the Central Station, to whose director the officers of the branch stations were responsible. To each station was assigned a certain territory, including several prefectures, and all questions arising in that territory were referred to the station located in the territory. With each station were associated several prefectorial experiment stations which for a number of years have been subsidized by the Government in order to encourage the establishment of other similar institutions. Beginning with 1900 the total appropriation for these subsidies was fixed at $65,000 per annum. Thirty-nine of these prefectorial stations have been organized, and of late their work

[a] See same laboratory, p. 191.

has been of such a nature as to make it possible for the Central Agricultural Experiment Station, in April, 1903, to reduce the number of branch experiment stations to three. Consequently the Hokuriku, Too, Tokai, Shikoku, Sanio, and Sanin branch stations have been transferred to the control of local governments, leaving only the Kinai, Kiushu, and Rikuu branch stations under the control of the central organization. This reduction in the number of branch stations has enabled the central organization to increase the funds and staffs of the remaining stations.

Central Agricultural Experiment Station, Nishigahara, near Tokyo.

Governing board.—Ministry of Agriculture and Commerce.

Station staff.—Dr. Y. Kozai, *Dir.;* Dr. M. Saito, *Chief Div. Agron.;* Dr. H. Sakano, *Chief Div. Agr. Chem.;* Dr. S. Konuki, *Chief Div. Ent.;* S. I. Kuwana, *Ent.;* Dr. S. Hori, *Chief Div. Veg. Path.;* Dr. H. Aoyama, *Chief Div. Tobacco;* Dr. T. Onda, *Chief Div. Hort.;* Dr. H. Ando, *Chief Div. Publications;* and Y. Hatano, *Chief Div. Accounts and Disbursements.* The staff of the Central Station and the three branch stations includes 28 other experts, 42 assistant experts, and 8 clerks, of whom 8 experts, 19 assistant experts, and 5 clerks are on duty at the Central Station and its outlying experiment fields. There are in addition many laborers and other employees.

Origin.—Established in 1890 as a provincial experiment field at Nishigahara. In 1893 the work of the experiment field was broadened and the Central Agricultural Experiment Station was organized. In 1899 a reorganization took place, and the divisions of agronomy, agricultural chemistry, entomology, vegetable pathology, tobacco, publications, and accounts and disbursements were established. In 1902 a division of horticulture was added.

Equipment.—Two large chemical laboratories, one for investigations in agricultural chemistry and the other for analytical work, laboratories for entomology and vegetable pathology, a glass vegetation house, two greenhouses, tobacco-fermenting house, two tobacco-curing barns, farm dairy, museum, libraries, etc. There is also an experiment field of 21 acres connected with the Central Station and a number of outlying experiment fields, one at Okitsu, in the prefecture of Shidzuoka, 110 miles from Tokyo, belonging to the division of horticulture, and two tobacco fields, one situated at Hatano, in the prefecture of Kanagawa, 48 miles from Tokyo, the other at Ota, in the prefecture of Ibaragi, 86 miles from Tokyo.

Income.—Budget of the Central Station and the three branch stations for the fiscal year ending March 31, 1904, $91,920, including $6,500 for buildings and repairs.

Lines of work.—Division of agronomy: Selection, culture, and manuring of forage and field crops; examination of seeds and plants; harvesting, curing, and preserving agricultural products; improvement of farm implements and arable soils; irrigation and drainage; breeding of live stock and poultry; apiculture; investigation of the relation of cultivation to soils, fertilizers, and climatic conditions; meteorological observations; distribution of seeds and plants, and the investigation of present agricultural conditions. Division of agricultural chemistry: Analysis of agricultural products, soils, fertilizers, irrigating waters, etc.; preparation of agricultural products; analyses and experiments for the public; inspection of commercial fertilizers and feeding stuffs; feeding experiments with live stock and poultry; chemical study of vegetable physiology; reports on the cultivation of soils and on plants, fertilizers, and poisonous substances, and experiments on the work of other divisions. Division of entomology: Classification and study of useful and injurious insects and animals, including the production and protection of useful insects; study of means for destroying injurious insects, and a study of climatic, geographical, and other conditions that are important in the life history of insects. The ravages of insects are studied and reports issued. Division of vegetable pathology: Study of plant diseases, their prevention and remedies; production of useful micro-organisms and parasitic micro-organisms; preparation of samples of pathogenic micro-organisms; research work in the destruction of injurious micro-organisms; reports on diseases and their geographical distribution, and pathological studies. Division of cattle feeding. Division of tobacco culture: Selection and culture of native and introduced tobaccos; reports on tobacco soils, fertilizers, and climate; drying, sorting, fermenting, and preserving tobacco; manufacture of sample cigars and cigarettes, and the study of tobaccos. Division of horticulture: Cultivation of native and introduced fruits and vegetables; investigations on the methods of propagation, harvesting, and storing fruits and vegetables; preparation of horticultural products; forcing experiments; determination and distribution of seeds and plants.

Each division is also required to conduct investigations required by the Ministry of Agriculture and Commerce, to answer questions asked by farmers, and to publish records of the results of its work.

Branch Stations.

Rikuu Branch Station, Hanadatemura, Akita.

Governing board.—The director of the Central Agricultural Experiment Station and the director of this station.

Station staff.—Dr. K. Ushimura, *Dir.;* 4 experts, 7 assistant experts, a clerk, and several other employees.

Origin.—Established in 1896.

Lines of work.—Investigation of agricultural problems in the colder regions of Japan.

Kinai Branch Station, Kashiwara, Osaka.

Governing board.—The director of the Central Agricultural Experiment Station and the director of this station.

Station staff.—Dr. K. Okada, *Dir.;* G. Daikuhara, *Chem.;* T. Nagasaki, *Agr.;* S. Kodama, I. Hamakawa, K. Kuriyama, and K. I. Okada, *Assts.;* K. Hoshino, *Clerk.*

Origin.—Established in 1893. Territory: Prefectures of Osaka, Wakayama, Kyoto, Hyogo, and Nara. The last three prefectures maintain experiment stations.

Equipment.—Two laboratories, a glass house containing 200 pots, and an experiment field of 6 acres.

Income—For 1902, $5,390 from the Ministry of Agriculture and Commerce.

Lines of work —Investigations in rice culture and soil chemistry; manurial experiments; analysis of fertilizers, soils, feeding stuffs, etc.; experiments with hemp, cotton, and indigo plants.

Kiushu Branch Station, Idzumimura, Kumamoto.

Governing board.—The director of the Central Agricultural Experiment Station and the director of this station.

Station staff.—Y. Otsuka, *Dir.;* T. Nakamura, *Chem.;* K. Shoshima, M. S., *Ent.;* T. Ishii, S. Aritoshi, K. Udo, and T. Hamaguchi, *Assts.*

Origin.—Established in 1893. The territory over which this station exercises jurisdiction includes the prefectures of Oita, Saga, Miyazaki, Kagoshima, Okinawa, Kumamoto, Nagasaki, and Fukuoka. All except Oita maintain experiment stations.

Equipment.—Well-equipped chemical laboratory, large glass house, and entomological laboratory.

Lines of work.—Experiments in the culture of rice and other cereals; vegetation experiments; analysis of soils, fertilizers, and feeding stuffs; studies in plant nutrition; investigations in economic entomology, and practical investigations for farmers.

Branch Stations Recently Transferred to Local Governments.

Tokai Branch Station, Anjomura, Aichi.

Origin.—Established by the Ministry of Agriculture and Commerce in 1896; transferred to the control of the local government in April, 1903.

Equipment.—Twelve buildings used as laboratories, offices, residences, stables, etc., and an experimental field of nearly 9 acres.

Through the center of the field runs an irrigating ditch, on one side of which is paddy soil and on the other dry land. The whole field is laid out into regular plats.

Income.—For 1902, $4,731 from the Ministry of Agriculture and Commerce.

Lines of work.—Study of the relation of climate to vegetation; irrigation investigations; investigations with soils, manures, and seeds; variety, cultural, and fertilizer experiments with paddy and upland rice, millet, sweet potatoes, soy beans, barley, wheat, rape, indigo plants (*Polygonum tinctorium*, *Indigofera anil*, and *I. tinctoria*), Japanese cotton, upland cotton, tobacco, fruits, etc.

Sanio Branch Station, Gioñmura, Hiroshima.

Origin.—Established by the Ministry of Agriculture and Commerce in 1893; transferred to the control of the local government in April, 1903.

Sanin Branch Station, Imaichi, Shimane.

Origin.—Established by the Ministry of Agriculture and Commerce in 1896; transferred to the control of the local government in April, 1903.

Shikoku Branch Station, Kanomyomura, Tokushima.

Origin.—Established by the Ministry of Agriculture and Commerce in 1893; transferred to the control of the local government in April, 1903.

Lines of work.—Vegetation experiments; analysis of soils, fertilizers, and feeding stuffs; practical investigations for farmers.

Too Branch Station, Magasakimura, Miyagi.

Origin.—Established by the Ministry of Agriculture and Commerce in 1893; transferred to the control of the local government in April, 1903.

Equipment.—A chemical laboratory and two experiment fields, one on the upland and one on the paddy soil.

Lines of work.—Vegetation experiments, mainly with rice, soy beans, barley, and wheat; analysis of soils, fertilizers, feeding stuffs, and other agricultural products; control of fertilizers.

Hokuriku Branch Station, Matsutomachi, Ishikawa.

Origin.—Established by the Ministry of Agriculture and Commerce in 1893; transferred to the control of the local government in April, 1903.

Kyoto Sericultural Institute, Kinngasa, near Kyoto.

Governing board.—The Ministry of Agriculture and Commerce.

Station staff.—G. Matsunaga, *Dir.;* three other experts; six assistant experts; three clerks, and a number of helpers.

Origin.—Established by the Government in 1899.

Equipment.—Lecture rooms; office; five silk nurseries and equipment for reeling; silk laboratory for investigating diseases of silkworms; chemical laboratory; eleven accessory buildings, and a mulberry plantation of nearly 4 acres.

Income.—For 1902, $14,176 from the Ministry of Agriculture and Commerce.

Lines of work.—Instruction and investigations in sericulture. The investigations include experiments in rearing and feeding silkworms, the reeling of silk, and studies of the physiology and pathology of silkworms. The station makes gratuitous distribution of silkworm eggs, and gives instruction by lectures and correspondence to silkworm growers throughout the country.

Tokyo Sericultural Institute, Nishigahara, near Tokyo.

Governing board.—Ministry of Agriculture and Commerce.

Station staff.—Dr. I. Honda, *Dir.;* six other experts; eleven assistant experts; four clerks, and a number of other employees.

Origin.—In 1884 an experiment laboratory for investigation of silkworm diseases was established in Tokyo. In 1886 this laboratory was removed to Nishigahara, and has since been broadened to include a number of other investigations.

Equipment.—Lecture rooms, silkworm nurseries, cocoon drying room, disinfection room, laboratory for investigating diseases of silkworms, leaf-preserving rooms, museum, reeling apparatus, etc.

Income.—For 1902, $25,647 from the Ministry of Agriculture and Commerce.

Lines of work.—At this institution instruction in sericulture and silk reeling is given to the students, and investigations are conducted including experiments in the rearing and feeding of silkworms, the reeling of silk, the cultivation of mulberry trees, and studies of diseases of silkworms.

Hokkaido Agricultural Experiment Station, Sapporo.

Dr. Y. Ibuki, *Dir.* Established in 1903 and under the control of the local government.

Experiment Station, Taichiu, Formosa.

Governing board.—Bureau of Industries of the government of Formosa.

Station staff.—S. Aoyagi, *Dir.;* two assistants; a sericulturist; a clerk, and a Chinese interpreter.

Origin.—Established in 1900 by the Prefecture of Taichiu. Brought under government control in 1901; reorganized and enlarged in 1903.

Equipment.—Office building, sericultural laboratory, cattle barn, and piggery.

Income.—For 1903, $6,525 from the State.

Lines of work.—Experiments with rice, tobacco, cotton, sugar cane, silk culture; experiments with cattle and pigs.

Experiment Station, Tainan, Formosa.

Governing board.—Bureau of Industries of the government of Formosa.

Station staff.—S. Aoyagi, *Dir.;* one assistant; a veterinarian; a clerk, and a Chinese interpreter.

Origin.—Established in 1899 by the Prefecture of Tainan; brought under government control in 1901.

Equipment.—Office building, two residences, a barn, and a students' dormitory.

Income.—For 1903, $4,611 from the State.

Lines of work.—Culture of rice, sugar cane, tobacco, cotton, indigo plants, and fruit trees; experiments with cattle; and instruction in agriculture to native boys.

Experiment Station, Taipeh, Formosa.

Governing board.—Bureau of Industries of the government of Formosa.

Station staff.—Y. Fujine, *Dir.;* two assistants; a veterinarian; a clerk, and a Chinese interpreter.

Origin.—Established in 1899 by the Prefecture of Taihoku. Brought under control of the government of Formosa in 1901; enlarged and reorganized in 1903.

Equipment.—Office building, two residences, barn, piggery, implement and seed room, students' dormitory.

Income.—For 1903, $6,526 from the State.

Lines of work.—Experiments with rice, tobacco, indigo plants, jute, China grass, forage plants, and fruit trees; animal husbandry experiments, especially with cattle and pigs; and instruction in agriculture to native boys.

Tea Experiment Station, Toshiyen, Formosa.

Governing board.—Bureau of Industries of the government of Formosa.

Station staff.—K. Fujie, *Tea Expert.*

Origin.—Established in 1901 under the control of the government of Formosa.

Equipment.—Tea house.

Income.—For 1903, $1,743 from the State.

Lines of work.—Experiments in tea production.

Prefectorial Agricultural Experiment Stations.

The 39 prefectorial experiment stations are partly supported by the Ministry of Agriculture and Commerce, but are under the control of the local governments. They maintain an intimate relationship with the branch stations under the Central Agricultural Experiment Station, and their officers hold frequent conferences with the officers of these branch stations.

The following table gives the name, location, date of establishment, and budget for the fiscal year ending March 31, 1904, of each of these stations:

Name.	Location.	Date of establishment.	Budget.
Tokyo fu[a]	Nakano, Tokyo	Apr., 1890	$5,818
Kyoto fu	Katsuramura, Yamashiro	Jan., 1890	3,222
Kanagawa ken[b]	Hodogaya, Kanagawa	Sept., 1886	4,399
Hyogo ken	Akashi, Harima	Nov., 1884	7,466
Nagasaki ken	Nakagawago, near Nagasaki	Dec., 1887	6,169
Niigata ken	Nagaoka, Echigo	Aug., 1885	9,408
Saitama ken	Tamaimura, Osatogun, Musashi	Apr., 1890	5,390
Gumma ken	Mayebashi, Kozuke	Sept., 1885	5,752
Ibaraki ken	Sakatomura, near Mito	Feb., 1890	11,232
Tochigi ken	Utsunomiya, Shimotsuke	Sept., 1885	3,926
Aichi ken	Kiyosu, Owari	Nov., 1884	10,202
Nara ken	Near Nara	Apr., 1885	4,089
Miye ken	Tsu, Ise	Oct., 1884	3,370
Shidzuoka ken	Toyodamura, Suruga	May, 1890	6,594
Yamanashi ken	Kofu, Kai	Feb., 1890	2,598
Shiga ken	Zeze, Omi	May, 1885	4,183
Gifu ken	Imaidzumi, near Gifu	Mar., 1891	4,262
Nagano ken	Near Nagano	Jan., 1887	4,713
Miyagi ken	Nagamachi, near Sendai	Mar., 1893	2,668
Fukushima ken	Near Koriyama, Iwashiro	Jan., 1887	4,192
Iwate ken	Motomiya, near Morioka	Feb., 1891	2,934
Awomori ken	Shinjo, near Awomori	Mar., 1890	3,302
Yamagata ken	Urushiyama, Uzen	Dec., 1886	6,372
Akita ken	Ushijima, near Akita	Nov., 1884	2,694
Ishikawa ken	Near Kanezawa	Feb., 1892	4,568
Toyama ken	Fukuno, Tonamigun	Dec., 1884	2,332
Tottori ken	Mihomura, Hoki	Feb., 1892	3,689
Shimane ken	Near Matsue, Izumo	Aug., 1886	6,857
Okayama ken	Takamatsumura, Bizen	Feb., 1890	6,761
Hiroshima ken	Near Hiroshima	Feb., 1890	5,137
Yamaguchi ken	Near Yamaguchi	Apr., 1886	6,664
Tokushima ken	Near Tokushima	Mar., 1893	2,827
Kagawa ken	Kuribayashimura, Sanuki	Jan., 1889	4,471
Yhime ken	Yodomura, Iyo	Feb., 1890	5,594
Kochi ken	Nagaokamura, Tosa	Sept., 1889	3,497
Fukuoka ken	Near Fukuoka	Dec., 1884	8,333
Saga ken	Kaminomura, Hizen	Mar., 1890	2,822
Miyazaki ken	Akayemura, Hyuga	May, 1889	2,200
Kagoshima ken	Aratamura, near Kagoshima	Feb., 1890	3,249

[a] Tokyo fu Agricultural Experiment Station.
[b] Kanagawa ken Agricultural Experiment Station.

Private Experiment Stations.

Marquis Matsudaira Experimental Farm, Old Castle, Fukui.
Count Hotta Agricultural Experiment Station, Sakura, Chiba.
Count Tachibana Experimental Farm, Near Kurume, Chikugo.

JAVA.

Botanic Station, Buitenzorg.

Station staff.—Dr. M. Treub, *Dir.* Division I: Herbarium and Museum— ——— ———, *Chief and V.-Dir.;* P. Demonchy, *Cur.* Division II: Botany—Dr. J. M. Bernhout, *Bot.* Division III: Experiment Garden and Agricultural Chemical Laboratory, Dr. P. van Romburgh, *Chief;* Dr. W. R. Tromp de Haas, *Asst. Chem.;* Dr. A. W. Nanninga, *Asst. Chem. for the Study of Tea;* A. Massink, *Mgr.* Division IV: Pharmacological Laboratory—Dr. W. G. Boorsma, *Chief.* Division V: Botanic Garden and Tjibodas Garden—H. J. Wigman, *Chief Hort.;* J. J. Smith. *Asst. Chief, Asst. Hort.;* J. W. Heyl, *Gard. at Tjibodas.* Division VI: Office, Library, and Photographic Studio—J. J. Brutel de la Rivière, *Chief;* C. E. F. Lang, *Photographer;* C. L. Schrijn and J. F. H. Samuels, *Clerks.* Division VII: Forestry—Dr. S. H. Koorders, *Chief;* Dr. Th. Valeton, *Bot.* Division VIII: Tobacco Laboratory—Dr. J. van Breda de Haan, *Chief;* Dr. E. C. J. Mohr, *Second Chem.* Division IX: Coffee Laboratory—Dr. J. G. Kramers, *Chief Chem.;* Dr. A. Zimmerman, *Bot.;* Miss B. M. R. Lang, *Asst.* Division X: Agricultural Zoological Laboratory—Dr. J. C. Koningsberger, *Zool.*

Origin.—Founded in 1817 by the Dutch Government. In 1885 the first of the laboratories was opened, and in 1890 the divisions of botany and agricultural chemistry were organized to make special investigations in the interests of colonial farmers. Other divisions since organized bring the number up to ten.

Equipment.—Botanical museum containing a large herbarium; pharmacological laboratory; two botanical laboratories, one for coffee and one for tobacco; agricultural chemical laboratory; greenhouses; laboratory for vegetable pathology; laboratory of agricultural zoology; laboratory for foreign investigators; photographic studio; about 1,100 acres of land, including a botanic garden of 143 acres, an experiment garden of 179 acres, and nearly 700 acres of forest on Mount Tjibodas, where still another laboratory has beeen erected.

Income.—Supported partly by the Government, partly by fees, and partly by associations of planters, who pay the salaries of several members of the staff engaged in agricultural research work.

Lines of work.—The division of agricultural chemistry and those for the study of tobacco and coffee are engaged almost exclusively in experimental investigations for the planters of the island. Besides the investigations with coffee, tea, and tobacco, which are most important, the work of the station includes investigations in entomology, plant physiology and forestry, fertilizer experiments, and botanical investigations with tropical plants and trees.

West Java Sugar Cane Experiment Station, "Kagok," Pekalongan.

Governing board.—The station is under the direct control of the Association of Sugar Manufacturers of Cheribon, Tegal, and Pekalongan.

Station staff.—H. C. Prinsen-Geerligs, *Dir. and Chem.;* Dr. Z. Kamerling, *Bot.;* M. van Deventer, *Asst. Ent.;* H. Tervooren, *Asst. Chem.;* H. A. G. van der Jagt, *Asst. Agr.;* J. V. Snoek, *Bookkeeper.*

Origin.—Founded at Tegal in 1886 by the Association of Sugar Manufacturers of Cheribon, Tegal, and Pekalongan; moved in 1901 to the present location.

Equipment.—Laboratory building containing chemical, botanical, control analytical, and other laboratories; rooms for sterilizers, polariscopes, stock, etc.; experiment station.

Income.—Supported by members of the Association of Sugar Manufacturers, of whom there are two classes: (1) Proprietors of sugar plantations, who pay an annual tax of about 30 cents per acre of sugar cane; (2) heads of commercial houses and private persons, who are assessed at least $48 per year. In this way an annual income of about $24,000 is provided.

Lines of work.—Cultural experiments with sugar cane, including the introduction and propagation of improved varieties; investigation of means for combating diseases and insect pests of sugar cane, and a study of all questions concerning the chemistry and manufacture of sugar.

Experiment Station for Indigo, Klaten.

Governing board.—Three members elected by the contributing planters. The general management of the station is vested in the director of the botanic station at Buitenzorg, of which this station is a branch.

Station staff.—J. J. Hazewinkel, *Dir.;* a botanist; and a helper.

Origin.—Established in 1896 by an association of planters. In 1902 it became a section of the botanic station at Buitenzorg.

Equipment.—A laboratory and an experiment field.

Income.—Six thousand five hundred and sixty-six dollars per annum.

Lines of work.—Scientific and practical investigations in growing and manufacturing indigo.

East Java Sugar Cane Experiment Station, Pasoeroean.

Governing board.—A committee of twelve members chosen in rotation from the membership of the Sugar Planters' Association of East Java.

Station staff.—J. D. Kobus, *Dir., Bot. and Chem.;* A. van Bijlert, Ch. D., *Agr. Chem.;* several assistants.

Origin.—Established in 1887.

Equipment.—Chemical and botanical laboratories, and experiment gardens.

Income.—About $26,000 per year, paid by members of the association. This is slightly increased by sale of cane and by fees.

Lines of work.—The station is devoted to the interests of sugar-cane production, and its work includes the analysis of fertilizers and materials used in the manufacture of cane sugar; studies on the diseases of cane and on insects injurious to it; testing of varieties and hybridizing; investigations on soils and drainage waters; meteorological observations.

Agronomic Station, Salatiga.

Station staff.—Dr. L. Zehntner, *Dir.*

Lines of work.—This station has been established and is supported by the cacao planters of Java for the purpose of investigating and combating the diseases and insect pests of cacao.

KONGO FREE STATE.

Botanic Garden and Experiment Station, Coquithatville.

The station was established in 1900.

LUXEMBURG.

Agricultural Experiment Station, Ettelbrück.

Staff.—Prof. C. Aschmann, *Dir and Chem.;* Drs. A. Biver and J. P. Arend, *Assts.*

MADAGASCAR.

Agricultural Experiment Station, Nahanisana.[a]

Governing board.—Prudhomme, who is chief of the Department of Agriculture in Madagascar.

Station staff.—Fauchère, *Dir.*

The station includes about 34 acres of land, part of which is a rice plantation, and was organized to make a survey of the agricultural resources of the island and to serve as a center for the dissemination of information on agricultural subjects. It is investigating means for improving the systems of culture now in use, introducing into the colony plants of economic importance and studying methods of breeding and improving live stock. Similar stations are located at Tamatave, Mananjary, and Fort Dauphin.

MALTA.

Sant' Antonio Gardens.

Staff.—John Borg, *Cur., in charge of Sant' Antonio Gardens and other gardens connected with it.*

Origin.—Founded in 1636 by Grand Master Antonio de Paola, brought under government control upon the death of the founder.

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[a] See Colonial Garden, Nogent-sur-Marne, p. 111.

Connected with this garden are the Boschetto Gardens and the Maglio Gardens, each under a head gardener.

Equipment.—Well-furnished nurseries at each garden; also three isolated nurseries known as St. Paul's nursery, Marina nursery, and Armier nursery.

Income.—For 1901, $9,490.

Lines of work.—Propagation and cultivation of ornamental trees, shrubs, and fruit trees, including the orange, the olive, the vine, and stone fruits. Investigation of insects and fungi affecting fruit trees; the introduction, cultivation, and distribution of vegetables.

Argotti Botanic Garden.[a]

Governing board.—Under government control.

Station staff.—Prof. Francesco Debono, M. D., *Cur.;* one keeper; three gardeners; four apprentices.

Origin.—Founded in 1676 under the Order of St. John of Jerusalem.

Equipment.—A botanic garden and laboratory, and an experiment field.

Income.—For 1902, $2,969, not including salaries.

Lines of work.—Instruction in botany to students; collection and classification of plants; introduction of new economic and ornamental plants; distribution by sale or exchange of seeds, bulbs, etc., and the dissemination of information in botany and agriculture by correspondence and otherwise; the training of apprentices in gardening.

MAURITIUS.

Botanic Gardens, Curepipe.[a]

F. Bijoux, *Overseer.*

Department of Forests and Botanic Gardens, Pamplemousses.[a]

J. Vankeirsbilck, *Dir.*

Agricultural Station, Réduit.

Governing board.—H. Leclézio, *Pres.;* W. T. A. Edwards, W. Newton, G. Robinson, F. Nash, G. Aubie, C. Antelme, the president of the Chamber of Agriculture; the president of the Royal Society of Arts and Sciences; R. Lejeunne, *Sec.*

Station staff.—P. Boname, *Dir.;* A. Edwards, *Asst. Dir.*

Equipment.—Laboratory and experimental field.

Lines of work.—Analysis of soils, fertilizers, manures, sugar cane and its products, and miscellaneous articles; investigation of injurious insects; variety tests with cane; fertilizing experiments; feeding experiments with cattle; silage experiments; tests of various fodder plants, and meteorological observations. Annual reports are published.

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[a] See Royal Gardens, Kew, p. 161.

Botanic Gardens, Réduit.[a]

W. A. Kennedy, *Overseer.*

NATAL.

Natal Agricultural Department, Pietermaritzburg.

Staff.—A. N. Pearson, *Dir. of Agr.;* Claude Fuller, *Ent.;* T. R. Sim. *Conservator of Forests;* E. O. Challis, *Dairy Expert;* Alex Pardy, *Official Analyst.*

The organized work of the Department of Agriculture appears to have begun with the appointment of a commissioner of agriculture October 1, 1895. The first report was addressed to the treasurer of the colony, but before the second report was issued a minister of agriculture was appointed. On November 20, 1901, the office of commissioner of agriculture was superseded by that of director of agriculture, to which position A. N. Pearson was appointed. The work of the department includes administrative duties, the enforcement of regulations against noxious insects and diseases of animals and plants, and the conducting of scientific investigations. A bacteriological laboratory under the directorship of H. Watkins-Pitchford is maintained for the study of diseases and the manufacture of mallein, vaccine, etc. The field investigations of the department are conducted at the Central Experiment Farm at Cedara. The official organ of the department for the dissemination of information is the *Agricultural Journal and Mining Record*, a monthly publication now in its seventh volume.

Central Experiment Farm, Cedara.

Staff.—Alexander Reid, *Farm Mgr.;* W. Hosking, *Field Expt.;* T. M. Whelan, *Mgr. Winkle Spruit Farm;* a nurseryman, a carpenter, and three farm assistants.

Origin.—Established in 1902.

Equipment.—An area of 3,614 acres, of which 250 acres are under cultivation; temporary residences and sheds have been constructed.

Lines of work.—The work already begun consists of field experiments with corn, potatoes, and other farm crops, including rust-resistant varieties of wheat, and with farm manures and other fertilizers.

Botanic Gardens, Durban.[a]

Governing board.—Committee of Durban Botanic Society; B. W. Greenacre, *Pres.;* F. W. Dore, *Sec.;* J. Medley Wood, *Treas.;* nine other members.

Station staff.—J. Medley Wood, *Cur.;* several assistants and helpers.

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[a] See Royal Gardens, Kew, p. 161.

Equipment.—Buildings include a large conservatory and palm house, several propagating houses, fumigating and potting house, curator's residence, herbarium containing 28,000 plants, and library. The gardens are quite extensive and are freely open to the public.

Income.—For 1900, $13,135, including government grants, balance from former year, receipts from produce sold and subscriptions and donations.

Lines of work.—The introduction and cultivation of new plants; experiments with fiber plants, roots, trees, and shrubs, many of which are of commercial importance; investigation of plant diseases and insect pests and of means for their suppression; meteorological observations; systematic botanical work with indigenous plants, the results of which are published under the title of "Natal Plants."

Botanic Gardens, Pietermaritzburg.[a]

Governing board.—A council composed of the mayors of Pietermaritzburg and Durban, ex-officio, two members named by the Government, and eight members elected by the Pietermaritzburg Botanic Society.

Staff.—George Robertson, *Cur.;* one assistant.

Equipment.—Greenhouses, nurseries, and botanic garden.

Income.—For 1901, $4,535 derived from corporation and government grants, subscriptions, and sale of trees, plants, etc.

Lines of work.—The collection, cultivation, and distribution by sale and otherwise of ornamental and economic plants.

NETHERLANDS.

CLASSES OF EXPERIMENTAL INSTITUTIONS.

There are in the Netherlands four classes of subsidized experimental institutions: (1) Government experiment stations and laboratories, (2) government demonstration fields, (3) dairy experiments, and (4) subsidized demonstration fields under the auspices of local agricultural and horticultural societies.

Government Experiment Stations and Laboratories.

There are five government experiment stations, located at Wageningen, Hoorn, Goes, Maastricht, and Groningen, a seed control station at Wageningen, and a laboratory of vegetable pathology at Amsterdam.

The general management of these stations is intrusted to a commission consisting of not less than five nor more than eleven members, all appointed by the Crown. The president, the secretary, and one or more additional members of the committee constitute the executive committee which has immediate charge of the affairs of the station. The commission makes annual reports to the Minister of Public Works, Commerce, and Industry.

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[a] See Royal Gardens, Kew, p. 161.

The director of each station is appointed by the Crown; the other officers—chemists, botanists, bacteriologists, assistants, etc.—are appointed by the Minister of Public Works, Commerce, and Industry on recommendation of the director. The directors of the various stations form a college which meets at least twice each year to discuss plans for experimental work and to lay out the cooperative experiments in charge of the instructors in agriculture and horticulture in the several provinces. The directors report annually to the executive committee of the experiment station commission. To each station is assigned a certain territory, and all questions arising in that territory must be referred to the station within its limits.

Willie Commelin-Scholten Laboratory of Vegetable Pathology, Amsterdam.

Governing board.—Prof. F. A. F. C. Went (*Utrecht*), *Pres.;* Prof. J. Ritzema Bos, *Sec.*

Staff.—J. Ritzema Bos, *Dir.;* C. J. J. von Hall, *Asst.;* a stenographer.

Origin.—Founded in 1895 by Mr. and Mrs. Commelin-Scholten at Amsterdam, in memory of their deceased son, Willie Commelin-Scholten.

Equipment.—A laboratory at Amsterdam.

Income.—From $2,500 to $3,000 per annum from the founders, and a government subsidy of $2,814 per annum.

Lines of work.—Investigations in vegetable pathology and economic entomology. The laboratory also furnishes information on plant diseases and noxious animals to farmers, fruit growers, horticulturists, etc.

Government Agricultural Experiment Station, Goes.

Governing board.—Commission of five to eleven members appointed by the Crown.

Station staff.—Dr. A. J. Swaving, *Dir.;* one chemist, four assistants, one clerk.

Origin.—Established in 1889 at Breda; removed in 1893 to Goes.

Equipment.—Three well-equipped laboratories in the station building, a garden surrounding the building, and experiment fields in the three provinces served by the station.

Income.—Annual appropriations by the Government, based on estimates by the director. Fees for analyses are turned into the government treasury.

Lines of work.—Analysis of farm products, fertilizers, sugar beets, etc.; field experiments with fertilizers, and soil analyses. Especial attention is given to beet culture, the manufacture of beet sugar, and feeding experiments to determine the influence of different kinds of food on butter. Together with other stations, this station is charged

with the examination of samples of butter taken according to the regulations of the pure-butter law of 1900. The territory served by this station includes Zeeland, with the South Holland islands of Goeree and Overflakkee, and a part of North Brabant. North Brabant and Limburg were included in the territory of this station until 1898, when Limburg and most of North Brabant were cut off.

Government Agricultural Experiment Station, Groningen.

Governing board.—Commission of five to eleven members appointed by the Crown.

Station staff.—Dr. B. Sjollema, *Dir.;* five assistants; four servants and clerks.

Origin.—Established in 1889.

Equipment.—A new laboratory building, a vegetation house, and gardens.

Income.—Annual appropriations by the Government based on estimates by the director. Fees for analyses are turned into the government treasury.

Lines of work.—Analysis and control of fertilizers, feeding stuffs, sugar beets, butter, and other farm products, and of soils; investigations in organic chemistry, soils, and plant nutrition. This station is located in a region where intensive culture is practiced. Its territory includes Groningen, Drenthe, and part of Friesland.

Government Agricultural Experiment Station, Hoorn.

Governing board.—Commission of five to eleven members appointed by the Crown.

Station staff.—Dr. K. H. M. van der Zande, *Dir.;* one chemist, four assistant chemists; one clerk; two assistants; and for the bacteriological division a bacteriologist (F. W. J. Boekhout), a chemist, and one assistant.

Origin.—Established in 1889.

Equipment.—Experiment station laboratories, including bacteriological laboratory, and an experimental dairy farm controlled by a directorate of five members of the Dairy Association of Hoorn.

Income.—Annual appropriations by the Government based on esti mates by the director. Fees for analyses are turned into the government treasury.

Lines of work.—Analysis of farm products, fertilizers, etc., for farmers. This station pays especial attention to dairy products, creamery methods, cattle feeding, and, together with the stations at Groningen, Goes, and Maastricht, is charged with the examination of samples of butter. Its territory includes the provinces of North Holland and South Holland, except the islands of Goerce and Overflakkee

and the pasture district of Friesland. At the experimental dairy farm experiments in dairying are conducted.

Government Agricultural Experiment Station, Maastricht.

Governing board.—Commission of five to eleven members appointed by the Crown.

Station staff.—Dr. D. Knuttel, *Dir.;* three assistants—one for dairy work; one clerk.

Origin.—Founded in the fall of 1897.

Equipment.—Laboratory.

Income.—Annual appropriations by the Government based on estimates by the director. Fees for analyses are turned into the government treasury.

Lines of work.—Analysis of farm products, fertilizers, soils, feeding stuffs, samples of water, and creamery products for farmers in the districts of Limburg and part of North Brabant.

Government Seed Control Station, Wageningen.

Governing board.—Commission of five to eleven members appointed by the Crown.

Station staff.—F. F. Bruijning, jr., *Dir.;* one botanist for microscopic investigation of foods; botanist for seed investigations; seven assistants; one stenographer; two clerks.

Origin.—Until 1894 seed control was in the hands of the different agricultural experiment stations. From 1894 to 1898 all of this work was done in the seed control division of the Central Agricultural Experiment Station, at Wageningen. Since 1898 a separate seed control station at Wageningen has been maintained.

Equipment.—Laboratories for seed investigations, microscopy and chemistry; botanic garden and collections.

Income.—All expenses in connection with the station are defrayed by the Government, which receives all fees for public and private seed testing. The total expenses of the station for 1902 were about $5,600.

Lines of work.—Seed control, botanical investigations and analyses, microscopic investigation of feeding stuffs, and some additional agricultural and botanical investigations.

Central Agricultural Experiment Station, Wageningen.

Governing board.—Commission of five to eleven members appointed by the Crown. The actions of the commission are subject to the approval of the Minister of Public Works, Commerce and Industry.

Station staff.—Prof. Adolf Mayer, *Dir.;* one chemist; two assistants; one clerk.

Origin.—Established by the Government in 1877. When stations were organized at Breda, Groningen, and Hoorn, this became the central station.

Equipment.—Laboratory and experimental garden.

Income.—Annual appropriations by the Government based on estimates by the director. Fees for analyses are turned into the government treasury.

Lines of work.—Investigations in soils, fertilizers, feeding stuffs, and vegetable physiology, and tobacco and other products. Chemical analysis of soils to determine the fertilizers needed receive special attention. The territory in charge of this station includes Gelderland, Overijssel, and Utrecht.

Government Demonstration Fields.

These fields are both agricultural and horticultural. The former are subsidized by the Government. The work of the latter is carried on through the cooperation of gardeners. The agricultural experimental fields in each province are in charge of an agricultural instructor, and in many provinces there is also a horticultural instructor, who besides conducting the demonstration fields carries on scientific experiments on separate fields. In the following list of government demonstration fields the names of the agricultural and horticultural instructors are given, together with the subsidy appropriated for each field.

Demonstration Field, North Brabant.

H. E. Huizenga, *Agr. Instr. for West North Brabant and the Bommeler Waard;* B. Lips, *Agr. Instr. for East North Brabant.* Subsidy, $720. N. Noble, *Hort. Instr.*

Demonstration Field, Utrecht.

H. D. S. Hasselman, *Agr. Instr.* Subsidy, $360.

Demonstration Field, Zeeland.

I. G. J. Kakebeeke, *Agr. Instr.;* N. Nobel, *Hort. Instr.* Subsidy, $360.

Demonstration Field, Gelderland.

H. Mayer Gmelin, *Agr. Instr.;* J. P. M. Camman, *Hort. Instr.* Subsidy, $640.

Demonstration Field, Drenthe.

J. Elma, *Agr. Instr.* Subsidy, $400.

Demonstration Field, Groningen.

J. H. Mansholt, *Agr. Instr.;* J. Leendertz, *Hort. Instr.* Subsidy, $400.

Demonstration Field, South Holland.

A. A. Neeb, *Agr. Instr.;* C. H. Claassen, *Hort. Instr.* Subsidy, $400.

Demonstration Field, Overijssel.

S. Koenen, *Agr. Instr.* Subsidy, $480.

Demonstration Field, Friesland.

C. R. Brinkman, *Agr. Instr.;* J. Leendertz, *Hort. Instr.* Subsidy, $400.

Demonstration Field, Limburg.

F. R. Corten, *Agr. Instr.;* E. Snellen, *Hort. Instr.* Subsidy, $95.81.

Demonstration Field, North Holland.

C. Nobel, *Agr. Instr.;* H. G. Hazeloop, *Hort. Instr.* Subsidy, $500.

Dairy Experiments.

Investigations in dairying outside of the regular experiment stations are conducted by dairy instructors who also attend meetings of farmers and give advice regarding the establishment of creameries and the analysis of milk, cream, and butter. The names and addresses of the dairy instructors and the subsidy received by each are as follows:

Name.	Location.	Subsidy.
J. Mesdag	Friesland	$1,020
A. Bos	South Holland	800
Dr. L. T. C. Scheij	North Holland	800
T. J. Snierstra	Utrecht	800
H. B. Hylkema	Gelderland and Overijssel	800
L. J. M. Koert	Zeeland	800
F. E. Posthuma	Drenthe	800
V. R. Y. Croesen	Overijssel	800
John C. v. Weydom Claterbos	Limburg	840
J. J. Huisman	Groningen	800

Subsidized Demonstration Fields.

These are conducted by agricultural and horticultural societies which are subsidized for the purpose in amounts ranging from $20 to $200. The names of the fields or of the societies conducting them, the officers in charge, and the amount of money each receives from the Government are as follows:

Potato Culture Fields of the Association for the Development of Agriculture in North Holland.

C. Nobel, *Agr. Instr.;* W. Teengs, *Sec. of the Assn.* Subsidy, $60. Experiments with potatoes.

Experiment Garden of the Association for Hoekschewaard's Interests at Klaasvaal.

L. Overwater, *Pres.;* A. Bouman, jr., *Sec.;* E. Middelburg, *Gard.* Subsidy, $200. Experiments with fruits and vegetables.

Experiment Field of the Gerard Adriaan van Swieten Agricultural School, Willemsoord.

This field is in charge of J. v. d. Have, Director of the Benevolent Association, which was organized in 1818 to colonize poor people on unoccupied land and aid them in obtaining work.

Experiment Field, Sappeneer.

G. Veenhuizen, *Expt.* The field is in charge of the trustees of the Peat Lands Colonization Agricultural Association and is devoted principally to testing potato fertilizers and varieties of potatoes. It receives a government subsidy of $100.

Experimental Field, Niew-Buinen.

In charge of the Agricultural Association of Niew-Buinen, A. Slim, *Sec.* Government subsidy, $60.

Potato Culture Fields of the Friesian Agricultural Association, Suameer.

K. L. de Vries, *Sec.-Treas.* Cultural experiments with potatoes. Government subsidy of $80.

Central Experiment Field, Kloosterveen.

J. Veenhoven, *Pres.;* E. Schragen, *Sec.* Subsidy, $40. Potato experiments.

Central Colonial Experimental Field, Valthermond.

J. Hadders, *Asst.* Subsidy, $80. Tests of potatoes, oats, and vegetables.

Experimental Fields, Broek on Langendijk.

J. Ritzema Bos, *Dir.;* J. G. Hazeloop, *Hort. Instr.* Subsidy, $80. Combating diseases of cabbage.

The Friesian Test Garden, Leeuwarden.

R. S. Fockema, *Pres.;* H. J. Tierevelt, *Sec.* Variety tests of vegetables, especially cabbage.

Experimental Garden of the Groningen Division of the Netherlands Association for Horticulture and Botany, Groningen.

J. de Waard, *Asst.* Subsidy, $80. Variety tests of vegetables and small fruits.

Horticultural Experiment Field of the Groningen Horticultural Association, Kolham.

P. C. Van Calear, *Pres.;* C. Veenhuizen, *Sec.* Subsidy, $20. Fertilizer experiments.

Association for Establishing and Maintaining a Test Garden, Hilversum.

M. Verschoor, *Dir.* Subsidy, $80. Variety tests of vegetables.

Association for Establishing Experiment Stations, New Amsterdam.

H. Rigterink, *Sec.* Subsidy, $200. Tests to determine the value of peat powder in breaking up land.

Association "The Testing Garden," Boskoop.

A. Koster, *V.-Pres.;* C. H. Claassen, *Sec.* Variety tests.

Association for Establishing and Maintaining the Test Garden at Aalsmeer.

J. Neomagus, *Sec.* Experiments in vegetable culture, including fertilizer tests.

Limburg Experimental Garden, Maastricht.

E. Snellen, *Hort. Instr.* Object, to establish demonstration gardens and to conduct experiments.

Testing Garden Association "Westland," Naaldwijk.

P. van Ruijven, *Pres.;* K. Kuijvenhoven, *Sec.;* K. Wiersma, *Dir.* Experiments with fruits and vegetables.

The Groningen Testing Garden, Groningen.

J. B. Westerdijk, *Pres.;* J. v. Sijpkens, *Sec.;* G. Reinders, *Sec.-Treas.* Experiments with fruits and vegetables.

Horticultural Experiment Field of the Groningen Agricultural and Industrial Society, Groningen.

In charge of J. Leendertz, *Leeuwarden.* Subsidy, $400. Variety tests with fruits, vegetables, and flowers; fertilizer experiments.

NEW ZEALAND.

New Zealand Department of Agriculture, Wellington.

T. Y. Duncan, *Minis. of Agr.;* J. D. Ritchie, *Sec. of Agr. and Chief Insp. of Stock.* The experiment stations of the colony are under the immediate direction of the secretary of agriculture, who is assisted by the chiefs of the pathological division, the dairy division, and the divisions of horticulture, viticulture, and statistics.

The Department of Agriculture, through its staff of scientists and inspectors, exercises general supervision over the agriculture of the island; conducts scientific investigations in chemistry, bacteriology, veterinary science, entomology, etc.; and in addition to the work done at the different experiment stations conducts numerous experiments on leased farms in various parts of the island. These experiments include investigations with fertilizers, field crops, fruits, and vegetables, and

experiments in dairying, animal production, and the repression of injurious animals and insects. Since 1893 the department has published annual reports, and more recently has begun printing bulletins and leaflets for the instruction of farmers.

Poultry Station at Burnham Industrial School, near Christchurch.

D. D. Hyde, *Directing Poultry Expert, Wellington.*

Colonial Botanic Garden, Christchurch.[a]

Ambrose Taylor, *Head Gard.*

Colonial Botanic Garden, Dunedin.[a]

J. McBean, *Supt.*

Colonial Botanic Garden, Invercargill.[a]

Thomas Waugh, *Head Gard.*

Canterbury Agricultural College, Lincoln.

Staff.—William Lowrie, *Dir., Agr.;* G. Gray, *Chem.;* C. O. Lillie, *Natural Sci.;* J. R. Charlton, *Vet.*

Equipment.—College buildings, farm of 710 acres, farm buildings, stock yards, implements, etc.

Lines of work.—Field experiments, including methods of culture; tests of fertilizers, varieties of cereals, forage crops and roots; and chemical and biological investigations.

Poultry Station, Milton, Otago.

D. D. Hyde, *Directing Poultry Expert, Wellington.*

Established in 1900. Fourteen poultry houses, incubator house, brooder house, 28 breeding pens, etc.

Colonial Botanic Garden, Napier.[a]

W. Barton, *Supt.*

Waikato Experiment Station, Ruakura, Hamilton.

Governing board.—Department of Agriculture.

Station staff.—E. Clifton, *Supt., Auckland;* M. Mulcahy, *Resident Overseer;* D. D. Hyde, *Directing Poultry Expert, Wellington;* C. Cussen, *Resident Poultry Expert.*

Origin.—Established in 1901.

Equipment.—Residences, poultry and dairy establishments, breeding animals, 900 acres of land.

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[a] See Royal Gardens, Kew, p. 161.

Income.—For 1902, $38,932 advanced by the State for the purchase of land and development of property.

Lines of work.—Experiments in dairying, general agriculture, poultry raising. Pure-bred breeding animals imported by the Government for public use are located at this station.

Experiment Station, Waerenga.

Governing board.—Department of Agriculture.

Station staff.—E. Clifton, *Supt., Auckland;* N. Kensington, *Resident Overseer;* Sr. Bragato, *Directing Vit.;* J. Potter and James Andrews, *Resident Vits.;* Palmer and Boucher, *Directing Horts. and Pomologists;* T. H. Barrett, *Resident Nurseryman.*

Origin.—In 1885 the land occupied by this station (1,800 acres) was set apart from the public lands to plant with acacia and eucalyptus trees to test the value of such lands for the production of tan bark and railway timber. In 1896 orchards and vineyards were established and trials of indigenous grasses were commenced. In 1901 an additional area of 1,200 acres was procured for the purpose of establishing a number of small fruit farms.

Equipment.—Residences for members of the staff, grape-crushing and fermenting house, wine cellars, mill for preparing tan bark, and 3,000 acres of land.

Income.—The annual crop of tan bark is the only source of income. For 1902 the receipts from this source amounted to about $3,890.

Lines of work.—Experiments and demonstrations in the production of tan bark from *Acacia decurrens;* experiments in utilizing lands, hitherto considered useless, for the production of orchard fruits, crops, and native grasses.

Momohaki Experiment Station, near Waverly.

Governing board.—Department of Agriculture.

Station staff.—F. Gillanders, *Overseer;* W. J. Palmer, *Nurseryman.*

Equipment.—A farm of 320 acres, containing an arboretum, nursery, and experimental plats, and supporting 25 horses, 56 cattle, 994 sheep, 400 chickens, and 230 ducks.

Lines of work.—Experiments are conducted with root crops, garden vegetables, cereals, grasses, hedge plants, fruits, and manures. Large quantities of nursery stock are distributed annually, meteorological observations are taken, and experiments in raising cattle, sheep, and poultry are conducted.

Colonial Botanic Garden, Wellington.[a]

G. Gibb, *Head Gard.*

[a] See Royal Gardens, Kew, p. 161.

Experiment Station, Weraroa.

Governing board.—Department of Agriculture.

Station staff.—G. Ross, *Overseer.*

Origin.—This station was formerly the Levin State Farm, but in 1900 it was reorganized and put in charge of the present overseer.

Equipment.—Farm buildings, orchards, live stock, and about 800 acres of land.

Income.—Supported by the Department of Agriculture. During the fiscal year ended March 31, 1901, the total expenditures were $13,735.

Lines of work.—The work of the past year has consisted mostly of clearing, fencing, and draining land, but some experiments with farm crops and cattle were conducted. Ultimately the station will be devoted largely to experiments in fruit growing and dairying.

NORWAY.

Department of Agriculture, Christiania.

V. Dons, *Sec. of Agr.;* J. Smitt, *Dir. of Agr.;* Dr. O. Malm, *Dir. of Vet. Service;* M. M. Selmer, *Dir. of For.*

With one or two exceptions the experiment stations, control stations, and laboratories of Norway are under the direct control of the secretary of agriculture or other officers of the Department of Agriculture. The experiment station and chemical laboratory connected with the Agricultural High School at Aas are under the control of the director of the high school. The director of the Veterinary Pathological Institute and Animal Vaccine Institute at Christiania is an officer of the department. All stations under the direction of the department receive subsidies from the Government, and the control stations also receive fees for all work of a private nature.

Experiment Station of the Agricultural High School of Norway, Aas.

Governing board.—The director of the Agricultural High School, who is responsible to the Department of Agriculture.

Station staff.—Prof. Bastian R. Larsen, *Dir.;* A. Hönningstad, *Asst.;* several assistants who superintend outlying temporary experiments. The director of the station is professor of agronomy in the Agricultural High School.

Origin.—In 1898 the Agricultural High School took up the experimental work begun in 1899 by the Royal Society for the Welfare of Norway.

Equipment.—The station uses the botanical and other laboratories, the plant house, and the forcing house of the Agricultural High School,

and has besides an experimental farm, which is provided with the ordinary farm buildings and implements.

Income.—The budget of the station is included in that of the Agricultural High School. During the years 1900 and 1901 the annual budget for experimental purposes was $4,368.

Lines of work.—Variety tests with barley, oats, and other cereals, and with grasses, clovers, lupines, root crops, and miscellaneous crops, and experiments with various systems of rotation. The results obtained at Aas are tested locally by experiments conducted by field managers on 150 private farms in different parts of Norway. The results of the work are published in the annual report of the Agricultural High School and in occasional contributions to the agricultural press.

Chemical Laboratory of the Agricultural High School, Aas.

Governing board.—The director of the Agricultural High School, who is responsible to the Department of Agriculture.

Station staff.—Prof. John Sebelien, *Dir.;* two assistants and one helper.

Origin.—In connection with the chemical work of the Agricultural High School, chemical investigations have been conducted for many years, but more especially since the reorganization of the school in 1897.

Equipment.—Equipment for students, laboratory and lecture room for the director, two laboratories for assistants, physiological chemical laboratory, balance room, dark room, preparation room, etc., all equipped with modern apparatus, gas, water, electric lights, etc.

Income.—An allowance of about $675 per annum (not including salaries amounting to about $2,000) from the budget of the Agricultural High School.

Lines of work.—Chemical investigations on soils, commercial fertilizers, manures, root crops, feeding stuffs, milk, etc.

Milk Control Station, Bergen.

Station staff.—H. Lundgaard, *Dir.* The station has no officers besides the director.

Origin.—Established in 1896.

Equipment.—Laboratory provided with butyrometer and other apparatus.

Income.—State subsidy of $676 and fees. The fee for testing a single sample of milk is 2.7 cents; for large numbers, half as much per sample.

Lines of work.—Determination of fat content of samples of milk sent in by creameries and farmers. In 1899, 40,120 samples were tested.

Agricultural Chemical Control Station, Christiania.

Governing board.—The director reports directly to the Department of Agriculture.

Station staff.—Sigmund Hals, *Dir. and Chem.;* Arne Kavli, H. Gregg, and Th. Melvar, *Assts. Chem.;* Olaf H. Qvam, *Bot. in charge of Seed Control.*

Origin.—Organized in 1891; began research work in 1892. Previous to that time, since 1863, the department of chemistry of the Agricultural High School at Aas had made analyses of agricultural products for private parties, for which purpose the Royal Society for the Welfare of Norway or the Government made small appropriations. This station, however, has no connection with the Agricultural High School at Aas. The seed control division was established in 1901.

Equipment.—A well-equipped laboratory in a private dwelling.

Income.—Budget from State for 1901, including salaries, $6,592.80. Fees for analyses amount to about $500.

Lines of work.—Analysis of feeding stuffs, dairy products, fertilizers, soils, water, seed, etc.; original investigations on various forage crops and concentrated feeding stuffs, especially Norwegian grain, hay, and fish products; on the composition of the fat of dairy butters; analytical and harvested products; field experiments. The work of the station is published in the annual report of the Department of Agriculture and in agricultural papers.

Milk Control Station, Christiania.

Station staff.—H. Olsen, *Dir.* The station has two officers besides the director.

Origin.—Established in 1894.

Equipment.—Laboratory provided with apparatus for testing milk.

Income.—State subsidy of $1,072 and fees.

Lines of work.—Determination of fat in samples of milk sent in by creameries and farmers. In 1901, 44,817 samples were analyzed.

Seed Control Station, Christiania.

Station staff.—Miss C. Steen, *Dir.*

Origin.—Established in 1886.

Equipment.—Laboratory and apparatus for seed testing.

Income.—For 1899, $428.80 (State, $294.80; fees, $134).

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc. In 1899, 234 samples were analyzed.

Veterinary Pathological and Animal Vaccine Institute, Christiania.

Governing board.—For the Veterinary Pathological Institute: The Department of Agriculture represented by the director-general of the

Veterinary Service. For the Animal Vaccine Institute: The Medical Service of the Department of Police.

Station staff.—Dr. O. Malm, *Dir.;* several assistants and helpers.

Origin.—The laboratory was established in October, 1890; the vaccine institute in 1892. The two institutions, although under different governing boards, are in the same building and under the same director.

Equipment.—A centrally located building which contains a library; two offices; dwelling for the keeper; four laboratories; museum; two rooms for vaccine calves and for the production of lymph; one room for the slaughtering and post-mortem work; two rooms for infected animals; stable; cow shed; one room for healthy rabbits, guinea pigs, rats, and mice; pigeon house; courtyard for larger animals, and inclosures for smaller animals during the summer.

Income.—For 1900, $4,260 (for the Veterinary Pathological Institute, $2,640; for the Animal Vaccine Institute, $1,620). These funds are appropriated by the Government.

Lines of work.—The Veterinary Pathological Institute conducts experiments and investigations in veterinary science of a pathological and bacteriological nature; examines animals sent in by veterinary surgeons and farmers; produces tuberculin, which is distributed gratis to veterinary surgeons, except when used for testing animals imported to quarantine stations, and conducts once a year courses in bacteriology, histology, and milk control for veterinary surgeons who have received fellowships from the Department of Agriculture.

The Animal Vaccine Institute produces and furnishes gratis to physicians and authorized vaccinators all the vaccine that is used in Norway. Between 60,000 and 90,000 samples of vaccine are distributed annually.

Seed Control Station, Hamar.

Governing board.—The officers of the "Hedemarkens Agricultural Society, Selskab."

Station staff.—John Rud, *Dir.*

Origin.—Established in 1886.

Equipment.—Laboratory and apparatus for seed testing; two rented rooms.

Income.—Annual subsidy from the "Hedemarkens Agricultural Society," $134 and fees.

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Entomological Laboratory, Nordstrand, near Christiania.

Staff.—Wilhelm M. Schøyen, *Govt. Ent.*

At the State Entomological Laboratory the entomologist investigates spraying apparatus and materials, studies injurious insects and

fungus and bacterial diseases of plants, and disseminates information regarding means for suppressing these pests and diseases. In 1901 271 investigations were carried out. The entomologist's duties as State inspector take him to all parts of the country.

Milk Control Station, Trondhjem.

Station staff.—Th. Soelberg, *Dir.* The station has no officers besides the director.

Origin.—Established in 1894.

Equipment.—Laboratory provided with butyrometer and other apparatus for testing milk.

Income.—State subsidy of $676 and fees. The fee for testing a single sample of milk is 2.7 cents; for large numbers, half as much per sample.

Lines of work.—Determination of fat in samples of milk sent in by creameries and farmers. In 1901, 54,436 samples were tested.

Agricultural Chemical Control Station, Trondhjem.

Governing board.—Under direct control of the Department of Agriculture.

Station staff.—Dr. E. Solberg, *Dir.;* E. Juel Michelet, *Asst.;* one helper.

Origin.—The buildings were constructed in 1898, and experimental work was begun January 2, 1899.

Equipment.—Laboratory costing $3,500 and library containing 316 volumes.

Income.—State subsidy and fees.

Lines of work.—Field experiments; analysis and control of fertilizers, feeding stuffs, soils, milk and dairy products, etc. In 1901, 873 samples were analyzed.

Seed Control Station, Trondhjem.

Station staff.—K. Schøyen, *Dir.*

Origin.—Established in 1886.

Equipment.—Laboratory and apparatus for seed testing.

Income.—Small subsidy from Trondhjem County and fees.

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

PARAGUAY.

School of Agriculture and Model Farm, Asunción.

Staff.—Moises S. Bertoni, *Dir.*

Lines of work.—Analysis and study of natural and manufactured products of the country; meteorological observations for the purpose

of studying the effect of climate on vegetation; experimental study of the elements concerned in the development of cultivated plants; study of varieties, composition, productiveness, acclimatization, etc., of cultivated plants.

PORTUGAL.

Agricultural Laboratory, Coimbra.

Staff.—Baptista Ramires, *Chem.;* Fereira, *Asst.*

Agricultural Laboratory, Evora.

Dr. Sonsa Coelho, *Chem.*

Agricultural Chemical Experiment Station, Lisbon.

Governing board.—Under control of the Agricultural and Veterinary Institute (Alv. Pereira, *Dir.*), with which it is connected.

Station staff.—Ramiro Larcher Marçal, *Dir. and Agr.;* Gabr. Osorio de Barros, jr., *V.-Dir.;* Dr. Otto Klein, *Chem.;* Dr. A. Wellmann, *Chem.;* A. Cardoso Pereira, *Bact.;* José Verrissimo de Almeida, *Veg. Path.;* several assistants.

Origin.—The Agricultural and Veterinary Institute was organized in 1852 under the name of the Agricultural Institute of Lisbon. It has since been reorganized four times, namely, in 1864, 1886, 1891, and 1897, but still occupies the buildings first erected for its use.

Equipment.—The buildings of the institute used for research work are the main building and a chemical building. In the main building there are offices and laboratories for the work in vegetable pathology, fermentation, and dairying. In the chemical building are several chemical laboratories, a bacteriological laboratory, a balance room, workrooms, etc. There is also an experimental field in connection with the institute.

Lines of work.—The work of this station is not very clearly defined. The staff of the Agricultural and Veterinary Institute, in addition to giving instruction to students, conduct some investigations in agricultural chemistry and vegetable pathology, study diseases of animals, prepare vaccine, investigate problems in the fermentation of wine, and conduct some field experiments.

Laboratory of Vegetable Pathology, Lisbon.

This laboratory is maintained in connection with the Bureau of Agriculture, which is a division of the Ministry of Public Works, Commerce, and Industry.

Agricultural Experiment Station, Mirandella.

This station is maintained for the purpose of encouraging agriculture in the Province of Tras os Montes.

Agricultural Chemical Experiment Station, Oporto.

Station staff.—Dr. Antonio Magalhães, *Dir.;* Carl Büttner, Avelino de Magalhães, and Adolfo Sonsa Reis, *Assts.*

RÉUNION.

Agronomic Station, Providence.

Station staff.———— ————, *Dir.;* Léon Châtel, *Agron.;* Eug. Seymour, *Agr. Chem.;* Edmond Bordage, *Ent., Vet. Path.*

Lines of work.—Cultural and fertilizer experiments and variety tests with tobacco, sugar cane, and other tropical agricultural products; chemical examination of fertilizers and agricultural products; study of noxious insects and diseases of plants.

Botanic Garden, St. Denis.[a]

Léon Châtel, *Dir.*

RHODESIA.

Department of Agriculture, Salisbury.

This department was until recently a division of the surveyor-general's department, but is now an independent organization with the following staff: E. Ross Townsend, *Sec.;* agriculturist, register of brands, staff of clerks, and the veterinary service, which includes a chief veterinary surgeon and five assistant surgeons.

Lines of work.—The department cooperates with farmers in experiments with cotton and tobacco, maintains a free veterinary service, and publishes bulletins for distribution among the farmers. It also supervises demonstration experiments with cereals, legumes, forest trees, and in irrigation.

Experiment Station, Salisbury.

The government of Rhodesia has established an experiment station about 2 miles from Salisbury. The work at present will be conducted by the staff of the agricultural department, under the direction of E. Ross Townsend, secretary. In 1903 about 100 acres were planted to grains, corn, Kafir corn, sorghum, cotton, tobacco, hemp, flax, cowpeas, and other leguminous plants. Special attention will be given to the breeding of disease-resistant plants, and work will also be carried on in the study of animal diseases. The work of the station will be supplemented by cooperative experiments with the farmers of the country.

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[a] See Colonial Garden, Nogent-sur-Marne, p. 111.

ROUMANIA.

Agricultural Experiment Station, Bukharest.

Cornelius Roman, *Dir.;* J. Enescu, *Chief Seed Div.*
Established in 1887.

Chemical Laboratory and Experiment Station for Tobacco Culture, Bukharest.

Dr. Maximilian Popovici, *Dir.*

Zootechnical Institute, Bukharest.

A. J. Locusteanu, *Dir.*

Experiment Field for Forage Plants and Irrigation Experiments, Constante.

C. Roman, *Dir.*

RUSSIA.

Ministry of Agriculture and Domains, St. Petersburg.

A. S. Yermolov, *Minis. of Agr. and Domains;* A. C. Steven, *Asst. Minis.;* S. H. Lenin, *Dir. Dept. of Agr.;* Th. P. Nikitine, *Dir. Dept. of For.;* N. A. Jossa, *Dir. Dept. of Mines;* I. I. Tihhéiev, *Dir. Dept. of Domains;* L. K. Lebedev, *Chancellor;* D. A. Timiryazev, *Dir. Div. of Agr. Econ. and Statistics;* and J. J. Yilinski, *Dir. Div. of Land Improvements.*

The Ministry of Agriculture and Domains as at present constituted was organized in 1894. It comprises departments of agriculture, forests, mines, and domains, and divisions of agricultural economy and statistics, and of land improvements. In 1901 there was established a system of commissioners of agriculture to preside over the agricultural affairs in their respective provinces or governments, and to seek to promote and improve the agricultural conditions in general. Beginning with 1903, these officers were styled "inspectors of agriculture," and attached to the offices of agriculture and domains, newly reorganized by the law of June 12, 1902. The inspectors of agriculture have charge of all public measures relating to agriculture and rural affairs, and exercise supervision over all local agricultural institutions maintained by the Government. They inquire into the agricultural needs of their respective governments, recommend government aid for such local or private enterprises as merit special encouragement, and are charged with the administration of the system of government loans on agricultural improvements and bounties for the encouragement of farm industries. They are expected to take an active part in provincial and municipal agricultural meetings, and to maintain close relations with all societies and conventions of farmers.

Connected with the inspectors' offices are corps of agricultural specialists and instructors who are assigned to the work by the department of agriculture. They go out among the landowners and peasants for the purpose of collecting data regarding the actual condition of various branches of agriculture, to diffuse general information on agricultural topics, and endeavor to improve the methods and practices in vogue. At the request of farmers they visit farms to give expert advice on questions of management, and they take active measures for the repression of insects, injurious animals, and plant diseases. The department of agriculture cooperates with these various agencies by the issue of manuals and other publications, and the inspectors recommend to the department such measures for the improvement of agricultural conditions in their respective governments as seem to them desirable. The estimated income of the Ministry of Agriculture and Domains for 1902 was $47,742,700.

Experiment stations in Russia have been established by private persons, by societies, by provincial or district governments (zemstvos), and by the Ministry of Agriculture and Domains. Many of them are merely demonstration fields established for the purpose of instructing the peasants, or of introducing new agricultural industries; others have been established as centers for the production and distribution of improved varieties of seeds and plants, and some are conducted as institutions for research. These stations are investigating a wide range of subjects, among which may be mentioned questions relating to the production of tobacco, beet sugar, wine, silk, cotton, olives, tea, and other products. They are also conducting investigations in chemistry, bacteriology, botany, dairying, agronomy, irrigation, and forestry.

Agricultural Chemical and Seed Control Station, Åbo, Finland.

Governing board.—Imperial Finnish Economic Society.

Station staff.—Dr. Ernst Löthner, *Dir.*

Income.—The station is supported by the State and the city of Åbo.

Lines of work.—Analysis of agricultural supplies and products and seed testing.

Aseyev Experiment Field, Alexeyevka, Zmiev District.

Origin.—Founded in 1899.

Income.—Maintained by the district zemstvo and the State, the latter granting $772.50 per annum.

Andizhan Experiment Field, Andizhan, Fergana Region, Turkestan.

Origin.—Founded by the Imperial Government in 1900.

Staff.—Dynin, *Dir.*

Income.—One thousand five hundred and forty-five dollars per annum.

Dairy Station, Barnaul, Siberia.

Belakchev, *Dir.*

Murom Experiment Field, Bielgorod, Govt. Kursk.

Origin.—Founded in 1900.

Income.—Maintained at the expense of the district zemstvo, the Bielgorod Agricultural Society and the State, the latter appropriating $154.50 annually.

Experiment Field of the Kharkov Society for Agriculture and Agricultural Industries, Bielgorod, Govt. Kursk.

Origin.—Founded in 1886 on the Novotavolzhanka estate.

Lines of work.—Variety tests and fertilizer experiments with sugar beets and the elaboration of methods of seed selection.

Experiment Field, Bodrowiz, Govt. Kiev.

Staff.—K. J. Dennissenko, *Dir.*

Agricultural Experiment Station, near Bogodukhov, Govt. Kharkov.

Origin.—Founded by P. I. Kharitonenko on the Parkhomov estate.

Staff.—J. Schukov, *Dir.*

Equipment.—Chemical and "selection" laboratories, experiment field, experiment plats in various parts of the estate, and a meteorological station.

Income.—The station is maintained at the expense of the founder, who allows $3,090 annually for its support.

Lines of work.—Manurial experiments with sugar beets, variety tests, selection experiments with sugar beets to obtain seeds for the beet fields on the estate of the founder, investigation of the soils of the estate, study of diseases of the sugar beet. The station has made important investigations of the diseases which cause the roots of sugar beets to shrivel.

Experiment Field, Bogoroslon, Govt. Samara.

Staff.—Teitel, *Dir.*

Origin.—Founded in 1896 by the district zemstvo.

Income.—An annual subsidy of $772.50 from the Imperial Government.

Lines of work.—Elaboration of rational methods of cultivation, fertilizer experiments, and the study of measures which may lead to decreasing the injurious effects of droughts.

Experiment Field of the Chistopol Agricultural Society, Chistopol, Govt. Kasan.

Origin.—Founded in 1900.

Income.—Maintained by the Chistopol Agricultural Society, with the aid of a Government subsidy of $515 per annum.

Agricultural Experiment Station, Chojnowo, Govt. Plotzk, Poland.

Governing board.—A council of five members.

Station staff.—Dr. Ignacy Kosiński.

Origin.—Organized in 1899 by an association of thirty-six landholders.

Equipment.—Laboratory and field of 55 acres for experiments.

Income.—About $1,600.

Lines of work.—Soil studies, including analyses and vegetation experiments; examination of fertilizers, feeding stuffs, and seeds; field experiments, and seed production.

Experiment Field, Chuchloma, Govt. Kostroma.

Truchanovski, *Dir.*

Uyutnoe Experiment Field, Dmitriev, Govt. Kursk.

Staff.—T. P. Wangenheim, *Dir.;* S. P. Gridin, A. T. Wangenheim, and R. G. Salenski, *Assts.* During the summer students of the secondary agricultural schools are admitted for practice.

Origin.—Founded in 1895 by T. P. Wangenheim, cooperating with the provincial and district zemstvos.

Income.—Subsidies from the district and government zemstvos and the Ministry of Agriculture and Domains amounting to $1,133. The proprietor provides the equipment, seeds, and land free of charge.

Lines of work.—Cultural experiments and variety tests with flax and with new plants.

Engelhardt Experiment Station, near Dorogobush, Govt. Smolensk.

Governing board.—Prince V. Uroussov (*Pres.*); N. Khomiakov, A. Touhochevski, A. Nesterov, V. Loveiko, S. Ionov.

Station staff.—H. Diakonov, *Dir.;* Otriganiev, Dobrinine, *Assts.*

Origin.—Founded in 1894 on the Batishchevo estate, formerly owned by the well-known agricultural scientist, A. N. Engelhardt.

Income.—An annual grant of $3,244.50 from the Government.

Lines of work.—Investigations to determine the best methods of improving the culture of field crops, experiments in crop rotations, and investigations with commercial fertilizers.

Chemical Control Station of the Imperial Livonian Economic Society, Dorpat (Yuryev), Govt. Livonia.

Station staff.—K. Sponholz, *Dir.;* F. Klemann, T. Barth, *Assts.;* F. Kulbach, *Gard.*

Origin.—Founded by the Imperial Livonian Economic Society.

Equipment.—Laboratory and experiment garden.

Income.—An annual grant of $1,854 from the Imperial Livonian Economic Society, and analyses amounting to about $515 per annum.

Lines of work.—Analysis of soils, fodders, and agricultural products; fertilizer experiments, and dissemination of information by lectures and articles published in agricultural journals.

Bacteriological Station of the Veterinary Institute of Yuryev, Dorpat (Yuryev), Govt. Livonia.

Station staff.—Prof. Karl Happich, *Dir.*

Income.—An annual appropriation of $1,545 from the Ministry of Agriculture and Domains.

Lines of work.—Bacteriological investigations with special reference to milk and dairy products. These include investigations of milk, butter, and cheese that are abnormal in color, taste, smell, consistency, etc.; investigations of the tubercle bacillus in milk and dairy products, and of water for use in the dairy industry; production and distribution of bacteria that are useful in dairying, especially of pure cultures for cream ripening; dissemination of information by means of lectures and published articles.

Experiment Field, Eupatoria, Crimea.

Verkhosunye Experiment Field, Glatzov, Govt. Viatka.

Origin.—Founded in 1891 by the Viatka Provincial Zemstvo.

Income.—$3,090 (provincial zemstvo, $2,317.50; Ministry of Agriculture and Domains, $772.50).

Lines of work.—Fertilizer experiments, especially with phosphates and bone ash; cultural experiments, and the sale of improved seeds and agricultural implements.

Golodnaya Steppe Experiment Field, Golodnaya Steppe, Samarkand, Turkestan (Central Asia Railroad).

Origin.—Founded by the Imperial Government in 1901.

Staff.—Greber, *Dir.*

Income.—One thousand five hundred and forty-five dollars per annum.

Flax Culture Station, Gorodishe, Govt. Kostroma.

Station staff.—G. Kornev, *Dir.*

Origin.—Founded in 1894.

Income.—Appropriations from the Ministry of Agriculture and Domains, amounting to about $1,484, and grants from the Kostroma Provincial Zemstvo.

Lines of work.—Experiments in flax retting; the introduction among the people of rational methods of preparing flax fiber; instruction in flax culture; and fertilizer experiments.

Experiment Field, Graivoron, Govt. Kursk.

Agricultural and Commercial Chemical Laboratory, Helsingfors, Finland.

Governing board.—Under the control of the Ministry of Agriculture and Domains.

Origin.—Founded in 1880.

Income.—Annual subsidies from the Imperial Finnish Agricultural Society and from the Helsingfors Municipal Zemstvo.

Lines of work.—Analysis of fertilizers, fodders, oils, etc., and seed testing.

Experiment Field of the Jeletz Agricultural Society, Jeletz, Govt. Orel.

Origin.—Founded in 1898.

Staff.—Koretneu, *Dir.*

Income.—An annual subsidy of $515 from the Ministry of Agriculture and Domains.

Lines of work.—Fertilizer experiments, the study of fodder plants suitable to the region, and experiments in soil cultivation.

Experiment Field, Kahanovskaya, Govt. Terek, Caucasus.

Staff.—J. A. Avilov, *Dir.*

Origin.—Founded in 1898 by the Ministry of Agriculture and Domains.

Income.—Annual grant of $1,545 from the Ministry of Agriculture and Domains.

Lines of work.—Measures are being tried to improve the condition of agriculture, which is very low in that region. Special attention is given to the cultivation of early vegetable crops, such as tomatoes, cabbage, beans, eggplants, etc., for shipment to St. Petersburg and Moscow markets.

Dairy Station, Kainsk, Siberia.

Stempel, *Dir.*

Experiment Cotton Fields, Karayazi, Govt. Tiflis, Caucasus.

Staff.—N. P. Taratinov, *Gen. Dir. of Cotton Fields*; W. A. Dmitrievski, *Supt. of the Karayazi field;* Th. I. Bajoolov, *Asst.*

Origin.—Founded in 1892 by the Ministry of Imperial Domains. In addition to the experiment cotton field at Karayazi, there are four demonstration cotton fields located in different provinces, all of which are under the general direction of N. P. Taratinov.

Equipment.—About 675 acres of land, with barns, dwellings, etc., meteorological station, nursery, and stock farm for mules and sheep.

Income.—Annual grants from the Ministry of Agriculture and Domains, amounting to $6,000 or $7,000.

Lines of work.—Experiments in cultivating cotton, demonstration of rational methods of culture, and experiments with various field and orchard plants, with and without irrigation, for the purpose of acclimatizing and introducing them into eastern Trans-Caucasia. Seeds of cotton and other plants are distributed among farmers.

Bacteriological Station of the Kasan Veterinary Institute, Kasan, Govt. Kasan.

Station staff.—Professor Lange, *Dir.;* Dmitriev, *Asst.*

Origin.—Founded in 1891 with financial aid from the Ministry of Imperial Domains.

Income.—Annual grants of $1,545 from the Minister of Agriculture and Domains.

Lines of work.—Assistance to farmers in combating contagious diseases, including inoculation for the prevention of anthrax, diagnosis of rabies, and the application of mallein and tuberculin; pure cultures of mouse typhus for the destruction of mice and field voles are distributed free.

Kashin Flax Culture Station, Kashin, Govt. Tver.

Station staff.—Mashine, *Dir.*

Origin.—Founded in 1899.

Income.—$1,493.50 from the Government and the district zemstvo.

Lines of work.—Experiments in growing and retting flax for the purpose of introducing rational methods among the flax growers.

Experiment Field, Khabarovsk, Govt. Maritime, Siberia.

Governing board.—The chief and the agronomist of the Department of Domains in the Amour Province, and the director of the experiment field.

Staff.—Gagin, *Dir.*

Origin.—Founded in 1895 by the Ministry of Agriculture and Domains.

Equipment.—A small building for the director and laborers, containing simple apparatus for analytical work and meteorological observations; experiment field and the necessary farm implements.

Income.—An annual grant of $1,287.50 from the Government.

Lines of work.—Acclimatization of the best varieties of cultivated plants, production of seeds to be distributed among the farmers, and the development of a system of soil cultivation adapted to the region.

Bacteriological Station of Kharkov Veterinary Institute, Kharkov, Govt. Kharkov.

Station staff.—Professor Raievski, *Dir.*

Origin.—Founded in 1888 by the Ministry of Imperial Domains.

Income.—A government subsidy of about $2,575 per annum.

Lines of work.—During the first few years of its activity the laboratory experimented in preventive inoculation for anthrax, and in 1893 it began to prepare and distribute mallein for the diagnosis of glanders in horses and to test vaccine for anthrax prepared by Tsenkovski and Pasteur. Experiments were made to determine the microbe which causes cattle plague. At the present time the station is engaged in the investigation of epidemic diseases and methods of combating them and in the distribution of serums for the different contagious diseases of animals.

Experiment Field, Kherson, Govt. Kherson.

Origin.—Founded in 1890 by the Kherson Provincial Zemstvo.

Equipment.—Laboratory, greenhouse with portable tables for experiments in plant physiology, and an experimental vineyard.

Income.—The field receives annually $1,287.50 from the State.

Lines of work.—Elaboration of rational methods of farming as applied to local conditions of soil and climate and the dissemination of information on the results obtained; experiments with barnyard manure, green manure, and mineral fertilizers and with various methods of fallowing; experiments in combating fungus diseases of cereals. In the laboratory, hothouse, and fields extensive experiments are conducted to determine the amount of water evaporated by spring wheat during its growth.

Seed Control Station and Agricultural Laboratory of the South Russian Society for Promoting Agriculture and Rural Industries, Kiev, Govt. Kiev.

Staff.—J. Bardsilevski, *Dir.*

Origin.—Founded in 1897.

Income.—An annual subsidy of $772.50 from the Ministry of Agriculture and Domains.

Lines of work.—Seed testing, and the analysis of agricultural products and supplies.

Technical Laboratory of the Kiev Section of the Russian Technical Society, Kiev, Govt. Kiev.

Lines of work.—Analysis of fertilizers and agricultural products.

Experiment Station of the Bessarabian School of Wine Making, Kishenev, Govt. Bessarabia.

Governing board.—A station council composed of the director and the heads of departments.

Station staff.—N. G. Kotelnikov, *Dir.;* M. F. Cherbakov, *Wine Maker;* Th. Th. Keppen, *Vine Dresser;* M. M. Pautinski, *Helper.*

Origin.—Founded in 1895 by the Ministry of Agriculture and Domains.

Equipment.—Experimental vineyard, comprising about 32 acres, and technical laboratory containing four large rooms, with all necessary apparatus; a yeast laboratory occupying two well-equipped rooms; a meteorological station, and a wine cellar with a capacity of 16,200 gallons.

Income.—An annual grant of $2,523.50 from the Government.

Lines of work.—The study of soils, of European and American vines to ascertain those best adapted to the region, and of various methods of making and keeping wine; study and analysis of local wines; analysis of soils, fertilizers, and materials used in vine dressing and wine making; experiments in various methods of culture in heeling and fertilizing grapevines, and in fermenting with pure-yeast cultures.

Experiment Field, Klin, Govt. Moscow.

Origin.—Founded in 1898 on the Krasni Kholm estate.

Income.—Maintained by the district zemstvo and the Department of Agriculture, the latter contributing $772.50 per annum.

Lines of work.—Field culture experiments.

Andreyev Experiment Field, Kobyliaki, Govt. Poltava.

Origin.—Founded in 1899.

Income.—Maintained by the district zemstvo with the aid of a State grant of $386 per annum.

Experiment Field, Kologriv, Govt. Kostroma.

Experiment Field, Korotcha, Govt. Kursk.

Koslov Experiment Field, Koslov, Govt. Tambov.

Origin.—Founded in 1900.

Staff.—Chomski, *Dir.*

Income.—Maintained by the Koslov Agricultural Society with the aid of an annual subsidy of $772.50 from the Ministry of Agriculture and Domains.

Dairy Station, Kurgau, Siberia.

Fhenkel, *Dir.*

Experiment Cotton Field, Kutaïs, Govt. Kutaïs, Caucasus.

Origin.—Founded in 1895 by the Ministry of Agriculture and Domains.

Staff.—S. Timotheev, *Dir.*

Income.—Annual grants of from $2,060 to $2,575.

Lines of work.—Experiments in cultivation of cotton and other textile plants; instruction to the people in rational methods of culture; experiments in the cultivation of corn and other cereals, alfalfa and other forage plants, peanuts, beets, olives, tea, etc., and the free distribution of seeds.

Kutno Agricultural Experiment Station, Kutno, Govt. Warsaw.

Origin.—Founded in 1900.

Staff.—Lt. Lesnevski, *Dir.*

Income.—Maintained by local landowners with the aid of an annual grant of $386 from the State.

Askhabad Experiment Cotton Field, Kyoshi, Trans-Caspian Region.

Origin.—Founded in 1897 by the Ministry of Agriculture and Domains.

Staff.—Baschmakov, *Dir.*

Income.—Government grant of $1,545 per annum.

Lines of work.—Demonstration of rational cotton culture; study of the influence of irrigation on yield of cotton; experiments in the rotation of other crops with cotton; variety tests; acclimatization and cultivation of different varieties of wheat, corn, sorghum, peas, and other crops.

Station for Seed Selection and Experiment Field of the Pliskovo Beet-Sugar Factory, Lipovetz, Govt. Kiev.

Origin.—Founded by V. S. Tishkevich.

Staff.—S. Frankfurt, *Dir.*

Lines of work.—Experiments to increase the yield of beets and their sugar content.

Experiment Tobacco Plantation, Lokhvitza, Govt. Poltava.

Staff.—P. M. Lomonosov, *Dir.*

Origin.—Founded in 1890 by the Lokhvitza Society of Agriculturists, which maintains the plantation with the help of an annual grant of $257.50 from the Ministry of Agriculture and Domains.

Income.—An annual grant of $257.50 from the Ministry of Agriculture and Domains.

Lines of work.—Study of methods of cultivation which give most satisfactory results in the production of Makhorka tobacco, a variety

of great importance in that region. This study embraces such questions as the distance of planting, the number of leaves to be left on the stem, the selection of varieties, the comparison of results when transplanted and when sowed in the row, and the influence of fertilizers.

Experiment Field for Oil Bearing Plants, Lokhvitza, Govt. Poltava.

Origin.—Founded in 1895 by the Lokhvitza Society of Agriculturists with financial aid from the Ministry of Agriculture and Domains.

Income.—A grant of $515 per annum from the Ministry of Agriculture and Domains.

Lines of work.—Experiments in the cultivation of oil-bearing plants and other economic plants, such as flax, hemp, poppy, sunflower, and garden cress.

Zapolye Experiment Station, Luga, Govt. St. Petersburg.

Governing board.—Prof. S. P. von Glasenap, representing the Ministry of Agriculture and Domains, and a council of ten local landowners and representatives of the zemstvo.

Station staff.—J. J. Sokhotzki, *Dir.;* one assistant.

Origin.—Established in 1889 by N. A. von Bilderling on his Zapolye estate, with the cooperation of the Imperial Free Economic Society; reorganized in 1895 and placed under the control of the department of agriculture.

Equipment.—Chemical laboratory, meteorological station, library, and a small museum.

Income.—For 1901, an annual grant of $2,935.50 from the Government.

Lines of work.—Cultural experiments with different varieties of rye, barley, oats, and potatoes, to ascertain those most suitable for the north of Russia; fertilizer experiments, especially with phosphates; the improvement of meadows; cultural experiments with fruit trees and berries; testing and distributing farm implements; distribution of valuable seeds; destruction of injurious insects; and meteorological observations.

Agricultural Experiment Station, Medtzi, Govt. Volhynia.

Origin.—Founded by Count I. A. Pototzki on the Antonine estate.

Equipment.—"Selection" laboratory, meteorological station, and experiment field.

Income.—The station is maintained at the expense of Count Pototzki.

Lines of work.—Selection experiments with sugar beets, variety tests with cereals, fertilizer and cultural experiments with sugar beets. The station also conducts a demonstration field for the benefit of the peasants in the neighborhood.

Experiment Station of the Courland Agricultural Society, Mitau, Govt. Courland.

Governing board.—President of the Courland Agricultural Society and the director of the station.

Station staff.—M. von Blaeze, *Dir.;* one assistant and the field foreman.

Equipment.—A laboratory at Mitau and experiment field at Tetelmünde, near Mitau.

Lines of work.—Field culture experiments; vegetation experiments; practical investigations for farmers; control of fertilizers, feeding stuffs, and seeds.

Experiment Field, Morshansk, Govt. Tambov.

Origin.—Founded in 1894 by the district zemstvo.

Lines of work.—Testing and demonstrating improved methods of culture, and the production of improved seed.

Bacteriological Agricultural Station, Moscow, Govt. Moscow.

Governing board.—One trustee; one representative of the Imperial Russian Society for the Acclimatization of Animals and Plants; the director, and ten other members.

Station staff.—S. A. Severin, *Dir.*

Origin.—Founded in 1894 by the Imperial Russian Society for the Acclimatization of Animals and Plants, with funds provided by W. K. Ferrein, an honorary member of the society.

Equipment.—A well-equipped bacteriological laboratory.

Income.—An annual grant of $1,390.50 from the Ministry of Agriculture and Domains.

Lines of work.—Investigation of theoretical and practical questions in agricultural bacteriology. Some of the questions which have received attention at the station are the decomposition of nitrates by bacteria, rôle of bacteria, in the decomposition of horse manure, the making of butter from cream ripened by means of pure cultures of lactic-acid bacteria, and the study of the silkworm disease known as flacherie.

Experiment Field of the Moscow Agricultural Institute, Moscow, Govt. Moscow.

Staff.—R. W. Williams, *Dir.*

Origin.—Founded in 1894 on the Petrovsko-Razumovskoe estate near the institute.

Income.—An annual grant of $618 per annum from the Ministry of Agriculture and Domains.

Lines of work.—Extensive experiments in the cultivation of buckwheat.

Agricultural Chemical Laboratory, Mustiala, Finland.

Prof. A. Rindell, *Dir.*

Experiment Station of the Agricultural and Dairy Institute, Mustiala, Finland.

Station staff.—K. Enchell, M. A., *Dir.*, *Agr.;* K. Ruhanen, M. A., *Agr. Chem.;* G. A. Bredenberg, M. A., *Dairying;* Leon Stenback, *Forester.*

Origin.—Founded in 1881.

Equipment.—Accommodations are provided for three divisions—agricultural chemistry, dairying, and forestry.

Lines of work.—Fertilizer experiments, investigations of milk, testing new dairy appliances, experiments in cattle feeding, investigations in the use of tuberculin for purposes of diagnosis, and acclimatization of forest trees.

Experiment Field of the Kharkov Agricultural Society, Nikolaevsko-Uljanovsko, Govt. Kharkov.

Viatka Flax Culture Station, Nolinsk, Viatka.

Origin.—Founded in 1892 by the district zemstvo.

Lines of work.—Cultural field exper ments, and the production of improved seed for distribution among farmers.

Experiment Farm of the Novo-Alexandrian Institute of Agriculture and Forestry, Novo-Alexandria, Govt. Lublin.

Governing board.—This farm is under the control of the Ministry of Public Instruction.

Staff.—Prof. P. V. Budrin, *Dir.;* M. P. Solonenko. *Asst.;* I. V. Belgowski, *Helper.*

Origin.—Founded in 1869.

Equipment.—There is an experiment farm of 247 acres, a vegetation house with 50 vegetation pots, 200 cylinders, and a small laboratory, and a dairy of 30 to 40 Swiss cows.

Income.—A government grant of $1,030 per annum in addition to the receipts from the farm and dairy.

Lines of work.—A variety of field experiments, including tests of fertilizers and varieties of field crops; pot and cylinder experiments, with different soils and fertilizers; dairy investigations.

Experiment Field, Novocherkassk, Govt. Don.

Staff.—Kolesnikov, *Dir.*

Origin.—Founded in 1891 by the Don Agricultural Society.

Income.—A government subsidy of $927 per annum.

Lines of work.—Elaboration of technical methods of cultivation suited to the requirements of the region, fertilizer experiments, and the production of improved seeds for the farmers.

Experiment Farm, Novo-Oshan, Rostock District, Govt. Jaroslav.

Staff.—M. A. Oshannin, *Dir.*

Origin.—Founded in 1891 by M. A. Oshannin with financial aid from the Ministry of Imperial Domains.

Income.—A government grant of $154.50 per annum.

Lines of work.—Experiments to determine the best cheap method of cultivating, drying, and preserving garden vegetables; cultivation of medicinal and scent plants; distillation of essential oils, and demonstrations for the instruction of the people.

Shatilov Agricultural Experiment Station, near Novosil, Govt. Tula.

Governing board.—S. Shatilov, *Pres.;* V. Navrotzki, S. Terehov, R. Loukianov.

Station staff.—W. von Wiener, *Dir.;* F. Fokin, *Asst.*

Origin.—Founded in 1896 by the Ministry of Agriculture and Domains, with the cooperation of Novosil zemstvo on an estate of about 150 acres donated by I. O. Shatilov.

Equipment.—Experiment farm of 150 acres, laboratory, and meteorological station.

Income.—An annual grant of $3,527.75 from the Ministry of Agriculture and Domains.

Lines of work.—Laboratory investigations and field experiments relating to questions of local agriculture, with special attention to the chernozem (black earth) soils. In addition there is considerable demonstration work of a purely practical nature.

Experiment Field, Odessa, Govt. Kherson.

Staff.—V. G. Rotmistrov, *Dir.*

Origin.—Founded in 1894 by the Imperial Agricultural Society of Southern Russia.

Equipment.—Experiment field of over 200 acres, vineyard, chemical laboratory, and a meteorological station.

Income.—Maintained by the Imperial Agricultural Society of Southern Russia with financial aid as follows: Kherson Provincial Zemstvo, $1,030; Odessa District Zemstvo, $309; Ministry of Agriculture and Domains, $1,236.

Lines of work.—Practical study of the agricultural problems of Southern Russia, and experiments to determine the period of time during which fertilizers continue to be active.

Experiment Field, Omsk, Govt. Akmolinsk, Siberia.

Staff.—V. Ph. Korolev, *Dir.*

Origin.—Founded in 1895 by the Ministry of Agriculture and Domains.

Income.—An annual grant of $618 from the Ministry of Agriculture and Domains.

Lines of work.—Introduction of winter cereals which are not produced to any extent in this region, fertilizer experiments, study of local forage grasses, experiments in gardening, and the testing of agricultural machines and implements.

Dairy Station, Omsk, Siberia.

Liring, *Dir.*

Experiment Field, Orlov, Govt. Viatka.

Origin.—Founded in 1893–1895 by the district zemstvo, with financial aid from the Ministry of Agriculture and Domains.

Income.—A government subsidy of $309 per annum.

Lines of work.—The production of improved seeds on a large scale, and familiarizing farmers with improved methods of cultivation.

Experiment Field, Ostrogoisk, Govt. Voronesh.

Ozurgeti Experimental Tobacco Plantation, Ozurgeti, Govt. Kutaïs.

Origin.—Founded by the Imperial Government in 1899.

Staff.—Eph. Chubkov, *Dir.*

Agricultural Experiment Station, Ploti, Govt. Podolia.

Governing board.—The founder, Prince Paul Trubetzkoi, and several professors of the University of Odessa.

Station staff.—Professor Bichichin, *Dir.;* B. Velbel, *Chem.;* A. Karabetov, *Mgr. Expt. Field;* A. Yunge, *Enol.;* M. Svolinski, *Met.*

Origin.—Founded in 1894 by Prince Paul Trubetzkoi on his estate.

Equipment.—Meteorological station, chemical laboratory, vegetation house, extensive experiment fields, a vineyard, and a wine-making establishment with a cellar.

Income.—The station is maintained at the expense of the founder, with annual grants of $1,287.50 from the Ministry of Agriculture and Domains. The total expenditures for 1900 were $3,238.21.

Lines of work.—The chief object of the station is the study of the properties of chernozem soils (black earth) by means of analyses and cultural experiments. Other lines of work include the analysis of fertilizers, wines, etc.; experiments in fermenting red wine by various methods; the use of pure cultures in wine making; experiments to determine the conditions under which mealy grains of barley are changed to flinty grains. Special attention is being given to studies of nitrogen in soils, rain water, and drainage water.

Experiment Field, Poltava, Govt. Poltava.

Governing board.—Poltava Agricultural Society.

Staff.—Ju. Sokolovski, *Dir.*

Origin.—Founded in 1885 by the Poltava Provincial Zemstvo.

Equipment.—Nursery, laboratory, etc.

Income.—Four thousand one hundred and twenty dollars annually, of which sum the State appropriates $2,266.

Lines of work.—Investigations in the interest of local agriculture. From experiments carried out in the field it has been found that "black fallow" accumulates more moisture and exercises a more favorable influence upon field crops than any other kind of fallow.

Flax Culture Station, Porkhov, Govt. Pskov.

Station staff.—N. Myasnikov, *Dir.;* Krilov, *Asst.*

Origin.—Founded in 1894 on the Dirini Gorki estate of L. I. Sakovich.

Income.—An annual grant of $1,493.50 from the Ministry of Agriculture and Domains, and grants from Pskov Provincial Zemstvo.

Lines of work.—Experiments in retting flax according to the American and other methods; the introduction among the people of rational methods of preparing flax fiber; experiments in the use of fertilizers in flax culture, and instruction in flax culture. Since 1897 experiments have been conducted in retting flax with the aid of pure cultures of the bacilli of flax retting, isolated by one of the specialists of the Ministry of Agriculture and Domains.

Khoinovski Experiment Station, Prasnishsk, Govt. Plotsk.

Origin.—Founded in 1899 by S. Th. Khelkhovski.

Income.—Maintained at the expense of local landowners, with the aid of an annual grant of $386 from the State.

Agricultural Chemical Experiment and Seed Testing Station of the Polytechnic Institute, Riga, Govt. Livonia.

Governing board.—This station is under the control of the Ministry of Public Instruction.

Station staff.— ——— ———, *Dir.;* W. von Haken, *First Asst. Chem.;* M. Hallay, *Second Asst. Chem.;* L. Stauwe, *Third Asst. Chem.;* Carl Pauts, *Clerk and Helper.*

Origin.—The Polytechnic Institute at Riga was organized in 1862, and two years later—September 1, 1864—the Agricultural Chemical Experiment Station was organized, with Dr. August Toepler, professor of chemistry in the institute, in charge of the work. In 1868 Dr. Toepler was succeeded by Prof. F. Weber, who served four years. In 1872 the station was reorganized and placed under the late Prof. George Thoms who was also professor of agricultural and physiological chemistry in the institute. In 1878 a seed control division was added, and the name of the station changed to its present form.

Equipment.—Laboratories for chemical and seed control work.

Income.—For 1899–1900, $3,402.55 (fees for analyses, $3,042.05; subsidies, $360.50).

Lines of work.—Analysis and control of fertilizers, feeding stuffs, seeds, and tapestries; analysis of foods, condiments, fuels, and agricultural products generally, and chemical and bacteriological investigations. For a number of years the station has been making thorough and extensive studies of the soils in Livonia and Courland, one of the purposes of these investigations being to secure "data for a rational taxation of farm lands." In connection with the tapestry control, qualitative tests of wall paper, dress goods, etc., for arsenic, phosphorus, and cyanogen, are made. Annual reports of the work of the station have been published since its organization as an independent institution in 1872.

Experiment Farm of the Riga Polytechnic Institute, Riga, Govt. Livonia.

Staff.—Prof. von Knirim, *Dir.*

This farm is located on the Peterhov State domain, a little over 16 miles from Riga. The lines of work include feeding experiments, investigations of soils, and tests with fertilizers, and various farm crops.

Agricultural Bacteriological Laboratory of the Ministry of Agriculture and Domains, St. Petersburg.

Station staff.—Dr. A. Theoktistov, *Dir.;* N. Andreev, *Bact.;* M. Grimm, *Bact.;* A. Nemm, *Zymologist;* B. Kariakin, *Chem.;* two helpers.

Origin.—Founded in 1891 by the Ministry of Imperial Domains. No work of a practical nature was done before 1896.

Equipment.—Four well-equipped laboratories—two bacteriological, one zymological, and one chemical—an office, library, museum, and technical laboratory for the production of bacteria.

Income.—An annual grant of $5.100 from the Government, including $3,900 from the department of agriculture for the destruction of mice and rats, and for the distribution of pure cultures of wine and milk bacteria.

Lines of work.—Laboratory investigations and field experiments in destroying mice and susliks by means of bacteria; investigation of the causes of decreasing virulence in bacterial cultures, and determination of the degree of virulence of various cultures; preparation of cultures in large quantities (including pure cultures of wine and butter bacteria which are sold for practical use), and of grain treated with strychnin for the destruction of rats.

Seed Testing Station of the Imperial Botanic Garden, St. Petersburg.

Governing board.—Ministry of Agriculture and Domains.

Station staff.—B. L. Issachenko, *Dir.*

Origin.—Founded in 1877.

Equipment.—Germinating chamber and other apparatus for investigations with seeds.

Income.—An annual grant of $309 from the Government and fees for seed testing.

Lines of work.—Seed testing, description of cultivated plants, and investigations in the physiology of germination.

Phytopathological Station of the Imperial Botanic Garden, St. Petersburg.

Station staff.—A. Yachevski, *Dir.*

Lines of work.—Investigation of fungus diseases of plants.

Agricultural Chemical Laboratory of the Ministry of Agriculture an Domains, St. Petersburg.

Governing board.—A committee of the department of agriculture.

Station staff.—Prof. P. S. Kossovich, *Dir.;* K. Gedroiz, L. Althausen, M. Grachev, and P. Lossev, *Assts.*

Origin.—Founded in 1897 at the Forestry Institute.

Equipment.—Two well-equipped laboratories, and a vegetation house with 800 vegetation pots.

Income.—For 1901, $4,120.

Lines of work.—Studies in plant nutrition; vegetation experiments; analysis of soils, fertilizers, and feeding stuffs.

Experiment Field, Samara, Govt. Samara.

Origin.—Founded in 1885 by the Samara Provincial Zemstvo.

Lines of work.—The improvement of methods of field culture prevailing in the government. From this field the people are supplied with improved seeds of cereals and grasses.

Grinovutsi Farm, Securyani, Khotin District, Govt. Bessarabia.

Origin.—Founded in 1902.

Income.—Maintained by the Grinovutzi Agricultural School, with the aid of an annual grant of $247 from the State.

Signakh Experiment Tobacco Plantation, Signakh, Govt. Tiflis, Caucasus.

Staff.—S. Chubkov, *Dir.*

Origin.—Founded in 1894 by Director Enfiadzianetz.

Income.—A grant of $515 per annum from the Ministry of Agriculture and Domains.

Lines of work.—Experiments to determine the varieties of tobacco best suited to the region, and also to determine the best methods for cultivating, curing, and finishing tobacco. The question as to varieties appears to have been settled. Platana, Samsoun, and Dubeg are varieties which are little inferior to the original Turkish tobaccos.

Dairy Station, Smeinogorsk, Siberia

Stravomyslov, *Dir.*

Agricultural Chemical Experiment Station, Sobieszyn, near Ivangorod, Poland.

Governing board.—The administrator of the estate of Prince Kajetan Kicki and the director of the station.

Station staff.—Dr. A. Sempolovski, *Dir.;* two assistants and a field foreman.

Origin.—Founded in 1886 by the administrator of the Prince Kicki estate; reorganized in 1892.

Equipment.—Chemical and botanical laboratories, meteorological station, vegetation house, seed testing station, and an experiment field of 35 acres.

Income.—About $4,120 per annum.

Lines of work.—Chemical analysis and investigation of the typical soils in Poland; botanical investigations; seed testing; variety tests, and other field experiments with cereals, hoed crops, forage plants, and other field crops; potato experiments with various fertilizers and soils; meteorological observations.

Horticultural and Agricultural Experiment Station, Sochi, Govt. Chernomorsk, Caucasus.

Station staff.—N. Liachovezki, *Dir.;* Enko, *Asst. Dir.*

Origin.—Founded in 1894 by the Ministry of Agriculture and Domains.

Equipment.—Laboratory; meteorological apparatus; a farm of about 4,500 acres, including experimental orchards, nurseries, field plats, and an experimental tobacco plantation.

Income.—An annual grant of $3,347.50 from the Government.

Lines of work.—The cultivation and study of subtropical plants, the acclimatization of fruit trees, raising and selling of seeds and nursery stock adapted to the region. Considerable attention is given to experiments with varieties of Indian corn, sorghum, castor-oil plant, cotton, legumes, and cereals. The object of the tobacco plantation is to ascertain the variety of tobacco best adapted to the region, and to develop a rational method of cultivating tobacco. The station also gives instruction in tobacco culture, and prepares practical men for that industry.

Bogoroditzk Experiment Field, Staroi-Oskol, Govt. Kursk.

Origin.—Founded in 1899 by I. A. Pulman.

Income.—Maintained by the founder with financial aid from the district zemstvo and the State, the latter granting $386 per annum.

Experiment Field, Stavropol, Govt. Stavropol.

Sudja Experiment Field, Sudja, Govt. Kursk.

Origin.—Founded in 1900.

Income.—Maintained by the Sudja Agricultural Society with the aid of a government subsidy of $515 per annum.

Horticultural and Agricultural Experiment Station, Sukhum, Govt. Kutaïs, Caucasus.

Station staff.—V. V. Markovich, *Dir.;* A. A. Liahovezki, *Asst. Dir.*

Origin.—Founded in 1894 by the Ministry of Agriculture and Domains.

Equipment.—Experimental garden with nurseries, vineyard, and experimental plats; experiment field; meteorological station.

Income.—An annual grant of $5,150 from the Ministry of Agriculture and Domains.

Lines of work.—Cultivation and investigation of numerous subtropical plants, such as tea, olives, and European and Japanese fruit trees, indigo, cotton, bamboo, and various medicinal and scent plants; raising and selling of seeds adapted to the region; acclimatization experiments; and meteorological observations.

Taganrog Experiment Field, Taganrog.

Origin.—Founded in 1899.

Staff.—G. Blinnikov, *Dir.*

Income.—Maintained at the expense of the Taganrog Agricultural Society and the State, the latter appropriating $618 annually.

Turkestan Agricultural Experiment Station, Tashkend, Govt. Turkestan.

Station staff.—R. R. Schroeder, *Dir.;* N. Alexandrov, *Asst. Dir. and Chem.*

Origin.—Founded in 1894 by the State.

Equipment.—Chemical laboratory, meteorological station, experiment field, and vineyard.

Income.—A State appropriation of $4,995 per annum.

Lines of work.—Investigation of the best methods for cultivating cotton and other fiber plants, and of the best means for utilizing irrigation water; experiments intended to improve methods of grape culture and fruit raising in the region, and cultural experiments with "dry valley rice," which the station is attempting to introduce.

Silk Culture Station, Tiflis, Govt. Tiflis, Caucasus.

Station staff.—N. Shavrov, *Dir.;* three assistants, twelve traveling experts in sericulture and bee keeping, a gardener, housekeeper, mechanician, and secretary.

Origin.—Founded in 1887 by the Ministry of Imperial Domains.

Equipment.—Laboratory containing technical, chemical, and biological divisions and silk-spinning mill, auditorium, shops, rearing house for worms, greenhouses, museum, library, mulberry plantation, and apiary.

Income.—An annual grant of $23,175 from the Government.

Lines of work.—Original investigations in the biology of the silkworm and experimental verification of similar investigations conducted by others, especial attention being given to the resistance of the worms to disease and to the improvement of silk and the eggs of silkworms; practical and theoretical instruction in sericulture; systematic investigations concerning the food of silkworms. The practical work of the station includes the production of healthy eggs, the testing of eggs sent to the station, the promotion or rational methods of caring for the eggs, and the distribution of healthy eggs among rearers of silkworms. The station is also engaged in developing and improving apiculture in the region. Reports of the station's work are published and popular illustrated articles and pamphlets in the vernacular of the natives are distributed.

Central Dairy Station, Tomsk, Siberia.

Kothergin, *Dir.*

Seed Testing Station at the Storehouse of the Tver Section of the Imperial Moscow Agricultural Society, Tver, Govt. Tver.

Station staff.—M. Devel, *Dir.*

Lines of work.—Seed testing.

Okun Experiment Field, Urshum, Govt. Viatka.

Origin.—Founded by the Viatka Provincial Zemstvo.

Income.—Three thousand and ninety dollars (provincial zemstvo, $2,317.50; Ministry of Agriculture and Domains, $772.50).

Lines of work.—Experiments with cereals, fertilizer experiments, and experiments in technical methods of cultivation.

Kostichev Agricultural Experiment Station, Valuiki, Govt. Samara.[a]

Station staff.—Vasili S. Bogdan, *Dir.;* S. Lebedev and V. Arapov, *Assts.*

Origin.—Established in 1894 by the Ministry of Agriculture and Domains.

Equipment.—Agricultural laboratory, meteorological station, and a farm of 845 acres.

Income.—An annual grant of $4,120 from the Government.

[a] Post-office address, *Staraya, Poltavka.*

Lines of work.—Situated in a region of alkali lands with a dry climate, the station is occupied with investigations and experiments relating to the accumulation, the conservation, and the rational utilization of atmospheric moisture, with the special purpose of improving and reclaiming alkali soils. Irrigation experiments, cultural experiments with different varieties to ascertain those best adapted to the region, and experiments in the cultivation of certain wild grasses are conducted; also control analysis of seeds and fertilizers, and the botanical analysis of hay.

Experiment Field of the Varnavin Zemstvo, Varnavin, Govt. Kostroma.

Origin.—Founded in 1898.

Income.—Maintained by the district zemstvo and the Ministry of Agriculture and Domains, the latter contributing $515 per annum.

Lines of work.—Various methods of soil cultivation and fertilizer experiments.

Peasant Experiment Farm, Velikoe Selo, Govt. Jaroslav.

Staff.—Ivan Yagodin-Kuvshinov, *Dir.*

Origin.—Founded in 1894 by Ivan Yagodin-Kuvshinov, with financial aid from the Ministry of Agriculture and Domains.

Lines of work.—Improvement of agricultural methods by practical demonstration of the use of new implements, the application of fertilizers, the value of growing seed, etc.

Agricultural Experiment Station, Viatka, Govt. Viatka.

Station staff.—S. H. Kossarev, *Dir.*

Origin.—Founded in 1895 by the Viatka Provincial Zemstvo, with the cooperation of the State.

Equipment.—Chemical laboratory, meteorological station, agricultural laboratory where seeds are tested and studies of injurious insects and plant parasites are conducted, experiment field of 105 acres.

Income.—Maintained by the provincial zemstvo, aided by an annual grant of $2,575 from the Ministry of Agriculture and Domains.

Lines of work.—Cultural experiments to determine varieties best suited to the locality, especially those of rye resistant to humidity and frost, peas of high-market value requiring a short period of growth, and potatoes adapted to local climatic conditions and possessing the necessary requirements for the manufacture of alcohol and starch; fertilizer experiments with phosphates, superphosphates, and turf; the testing of agricultural machines and implements; the study of soils; and meteorological observations. The station organizes cooperative experiments on the experiment fields and farms of the zemstvo.

Experiment Farm, Vuisokoe Selo, Govt. Jaroslav.

Staff.—N. P. Sabanyeev, *Dir.*

Origin.—Founded by N. P. Sabanyeev in 1894, with financial aid from the Ministry of Agriculture and Domains.

Lines of work.—Demonstration of improved methods in agriculture, and experiments with fertilizers and in the cultivation of flax and garden vegetables. The application of common salt as a fertilizer for flax has given good results.

Seed Testing Station of the Museum of Manufactures and Agriculture, Warsaw, Poland.

Governing board.—Five trustees appointed by the Museum of Manufactures and Agriculture, and the director.

Station staff.—Zdzistav Zielinski, *Dir.;* four assistants.

Origin.—Founded in 1880 by the Count Ludwig Krasiński and donated to the museum.

Equipment.—Laboratories at Warsaw, and an experiment garden at Kazimierz in the government of Lublin.

Income.—For 1901, $1,339 (State, $309; endowment from the museum, $515; fees, $515).

Lines of work.—Seed testing, analysis of hay, preparation of herbariums, mechanical and microscopical analysis of feeding stuffs, and cultural experiments with agricultural plants.

Agricultural Chemical Laboratory and Control Station of the Esthonian Agricultural Society, Weltz, near Wesenberg, Govt. Esthonia.

Governing board.—A committee appointed by the Esthonian Agricultural Society.

Station staff.—N. von Dehn, *Dir.;* Dr. von Harpe, *Asst.*

Origin.—Founded in 1895 by the Esthonian Agricultural Society.

Equipment.—Well-equipped chemical laboratory, with vegetation pots.

Income.—Fees and miscellaneous receipts, $773 per annum.

Lines of work.—Analysis of fertilizers, soils, and fodders, and seed testing.

Enological Chemical Laboratory and Experiment Cellar of the Nikita School of Horticulture and Wine Making, Yalta, Govt. Taurida.

Lines of work.—Analysis of wines, water, and soils; investigations to determine the value of various kinds of grapes; investigations in fermenting grape must; fertilizer experiments; and investigation of the quality of olive oil from the plantations of the southern coast of Crimea.

Tobacco Experiment Plantation, Yalta, Govt. Taurida.

Origin.—Founded in 1897 by the Ministry of Agriculture and Domains at the Nikitsk Imperial Garden.

Lines of work.—Experiments with Macedonian tobacco to ascertain the varieties best suited to the climatic and soil conditions of the southern coast of Crimea and to develop improved methods of cultivation.

Experiment Field, Yekaterinskaia, Kursk.

Asanov Experiment Field, Yelabuga, Viatka.

Origin.—Founded in 1897 by the Viatka Provincial Zemstvo.

Equipment.—Field, garden, apiary, orchard, and nursery.

Income.—An annual subsidy of $206 from the Ministry of Agriculture and Domains.

Lines of work.—Fertilizer experiments and variety tests.

Experiment Forests.

(1) On the watershed between the Volga and the Don, Khryenov, Govt. Voronezh.

(2) On the watershed between the Don and the Donetz, Starobyelsk, Govt. Kharkov.

(3) On the watershed between the Dnieper and the Donetz, Velikoanodalsk, Govt. Ekaterinoslav.

Origin.—These three experimental forests were founded in 1892 by the bureau of forestry.

Equipment.—Each forest covers an area of from 12,000 to 25,000 acres.

Lines of work.—Planting of forests and study of forestry methods (1) on the steppes of the watersheds, (2) on soils not suited for cultivation, and (3) in dry and wet ravines; experiments in strengthening ravines and exposed river banks; cultivation of fruit trees and shrubs on the steppes; irrigation experiments with subterranean waters and with snow and rain waters; utilization of herbaceous plants; establishment of experiment fields (6 in number) in order to study the protecting influence which planted forests may exercise on the agriculture of the steppes; and the establishment of norms (rational proportions) between the areas of forest, water, meadow, and cultivated fields.

SPAIN.

Enological Station, Ciudad Real.

José Maria Marti, *Dir.*

Enological Station, Haro.

Victor C. Manso de Zuñiga, *Dir.*

Equipment.—Laboratory and experiment field.

Lines of work.—Analysis of wines and musts; experiments in wine making from different varieties of grapes, vineyard work, and meteorological observations.

Experiment Station of the Agricultural High School, Madrid.

Station staff.—Prof. Josef Hurtado de Mendoza, *Dir.;* A. Dorronsoro, *Chief of Anal. Lab.*

Origin.—Established about 1890.

Equipment.—Chemical and physiological laboratory, meteorological observatory, vegetation cases, experimental farm and stables at Moncloa. Government experimental farms are also maintained at Barcelona, Caceres, Corunna, Jerez, Saragossa, and Valencia.

Lines of work.—Investigations in chemistry and animal and plant physiology; analyses and other work of a general character demanded by the Government or by local authorities; analysis of soils, fertilizers, seeds, plants, and other agricultural products for the public. Several bulletins have been issued.

Experiment Station for Vegetable Pathology, Madrid.

Prof. C. Ascarate, *Dir.*

Sericultural Station, Murcia.

Station staff.—Emiliano Lopez, *Dir.*

Origin.—Founded in 1892 by the State and the Province of Levante.

Equipment.—Micrographic laboratory and demonstration fields for the culture of mulberry trees.

Lines of work.—Experiments in the selection and rearing of silkworms. Efforts are being made to improve methods of silkworm culture, and to this end small popular bulletins are published and distributed among silkworm growers.

Enological Station, Palencia.

Francisco A. Estrada, *Dir.*

Enological Station, Toro.

Marcelino Arana, *Dir.*

Enological Station, Villafranca del Panades.

Claudio Oliveras, *Dir.*

STRAITS SETTLEMENTS.

Botanic Garden, Penang.[a]

Staff.—Henry N. Ridley, *Dir.;* W. Fox, *Supt. of Forests and Gardens;* native assistant and artist.

[a] See Royal Gardens, Kew, p. 161.

Origin.—Founded in 1885 as a public garden by the government of the Straits Settlements.

Equipment.—Herbarium, plant sheds, orchid house, nurseries for the propagation and dissemination of useful and ornamental plants.

Income.—For 1902, government grant of $6,906.

Lines of work.—Systematic, economic, and garden botany and forestry.

Botanic Gardens, Singapore.[a]

Staff.—Henry N. Ridley, *Dir.;* W. Fox, *Asst. Supt.*

Origin.—Commenced by the Agri-Horticultural Society in 1860; taken over by the Government in 1874 and put under a superintendent and committee of management appointed annually.

Equipment.—Herbarium and museum building, plant houses, aviaries, and other buildings; library, nurseries, and botanic garden.

Income.—For 1902, $14,291.77 (government grant, $8,000; balance from 1901 and interest, $2,831.24; sale of plants and seeds, $3,460.53).

Lines of work.—Cultivation and propagation of economic and ornamental plants and trees; investigation of insect pests and plant diseases. Special attention is given to the cultivation of gutta-percha and india rubber. Annual reports and a monthly bulletin are published.

SWEDEN.

State Department of Agriculture, Stockholm.

A. T. Odelberg, *Minis. of Agr.;* C. H. H. Bennich, *Under Sec.*

The State Department of Agriculture comprises two bureaus, under which are grouped boards of land surveying, horse breeding, domains and forests, agriculture and fisheries, geological mapping, and hydrographical and biological exploitation of the sea. It controls and maintains the Agricultural Academy, at Albano, with which an experiment station is connected, and gives partial support to nine chemical stations, eighteen seed-control stations, several stations organized by societies, and a number of agricultural schools. Connected with the department is a corps of agricultural engineers and instructors, veterinarians, and fishery experts.

Entomological Station, Albano, near Stockholm.

Governing board.—State Department of Agriculture.

Station staff.—Prof. Sven Lampa, *Dir.;* A. Tullgren, B. A., *Asst.*

Origin.—In 1880 the Government created the position of State entomologist, and appointed Dr. A. E. Holmgren entomologist. In 1887 he was succeeded by Prof. Sven Lampa, and in 1897, by act of the Riksdag, the entomological station was created.

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[a] See Royal Gardens, Kew, p. 161.

Equipment.—Two laboratories, two insectaries, and an experiment garden.

Income.—An annual appropriation of $1,862.60 from the State.

Lines of work.—The principal duties of the State entomologist have been to disseminate information regarding the injurious insects of the country and to make investigations regarding the same, so far as the resources of the station will allow. Among the more important investigations are those concerning the gypsy moth, Hessian fly, wireworm, crane fly, and grass worms. The entomologist has published a number of valuable pamphlets on the crop pests of Sweden.

Experiment Station of the Agricultural Academy, Albano, near Stockholm.

Governing board.—The administrative committee of the academy.

Station staff.—Dr. H. G. Söderbaum, *Chief Div. of Agr. Chem.;* Dr. C. G. Eggertz, *Asst.;* Dr. Jakob Eriksson, *Chief Div. of Plant Physiol.;* G. H. Lind, *Hort.;* S. Rhodin, *Agr.*

Origin.—In 1817 the Agricultural Academy established an experiment field and nursery in the vicinity of Stockholm. In 1856 a chemical laboratory was added, and in 1886 a botanical laboratory.

Equipment.—Agricultural chemical building, containing the director's office, balance room, and two laboratories; laboratory for physiological chemical investigations; laboratory for volumetric analysis; dark room; storerooms, etc. The laboratories are well equipped throughout. There are also extensive experiment plats, some of which are provided with a protection of wire netting; a vegetation house; zinc and glass vegetation pots, the former sunk in the earth and the latter inclosed in canvas for protection and mounted on cars; a laboratory, experiment field, vegetation house, and lysimeter for the division of plant physiology, and a meteorological observatory.

Income.—An annual grant of $6,030 from the Government, and receipts from the sale of farm products amounting to about $14,000 per annum.

Lines of work.—There are three distinct lines of investigation, namely, agricultural chemistry, plant physiology, and agricultural-horticultural field experiments. The chemical work includes the analysis of feeding stuffs, fertilizers, and soils, and investigations with fertilizers. The physiological work is best known through the investigations of Doctor Eriksson with wheat and other cereals, especially his studies of grain rusts, but it includes also studies of other fungus diseases of plants, and culture experiments with forage plants. The field work includes fertilizer experiments, practical investigations in agriculture and horticulture. A few other experiments are conducted, notably those with dairy cows, and in animal nutrition. Reports of the work done at the station are published in the Transactions of the

Royal Agricultural Academy (*Kongl. Landtbruks-Akademiens, Handlingar och Tidskrift*), which is issued bimonthly.

Seed Control Station, Borås.

Governing board.—A committee of the Agricultural Society of the Province of Elfsborg.

Station staff.—A. W. Essén, *Dir.*

Origin.—Founded in 1884 by the Agricultural Society of the Province of Elfsborg; brought under State control in 1887.

Equipment.—Room for germination tests and a workroom.

Income.—Annual grants from the State of $120.60, contributions from agricultural societies of $134, and fees for seed testing.

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.; consultations.

Seed Control Station, Christianstad.

Governing board.—A committee of the Agricultural Society of the Province of Christianstad.

Station staff.—Dr. L. J. Wahlstedt, *Dir.*

Equipment.—Seed control laboratory.

Income.—Annual grants from the State of $134, and contributions from agricultural societies of $134, besides fees for seed control.

Lines of work.—Analysis and control of farm and garden seeds and consultations regarding the same.

Seed Control Station, Gefle.

Governing board.—Committee of Agricultural Society of the Province of Gefleborg.

Station staff.—A. Westman, *Dir.;* one assistant.

Origin.—Founded in 1883 by the Agricultural Society of Gefleborg; brought under State control in 1887.

Equipment.—Seed testing laboratory.

Income.—Annual grants from the State of $147.40; from the controlling society, $227.80, besides fees amounting to about $70 per annum.

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Seed Control Station, Göteborg.

Governing board.—A committee of the Agricultural Society of the Province of Göteborg and Bohus.

Station staff.—Dr. J. E. Alén, *Dir.*

Origin.—Founded in 1879 by the Agricultural Society of Göteborg and Bohus; brought under State control in 1891.

Income.—For 1902, $625.08 (State, $107.20; agricultural society, $254.60; fees, $263.28.)

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Chemical and Seed Control Station, Halmstad.

Governing board.—Committee of the Agricultural Society of the Province of Halland.

Station staff.—E. Lyttkens *Dir.;* R. S. Ohlsén, *Asst.*

Origin.—This station, which was established in 1876, is the oldest separate station in Sweden.

Income.—For 1899: Chemical division, $3,097.65 (balance from 1898, $162.01; State, $1,072; contributions from societies, $670; fees for analyses and miscellaneous, $1,193.64). Seed control division, $450.85 (balance from 1898, $1.06; State, $174.20; contributions from societies, $227.80; fees for analyses, $47.79).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, etc.; seed control, and bacteriological investigations. The station publishes annual reports.

Chemical and Seed Control Station, Hernösand.

Governiny board.—Committee of the Agricultural Society of the Province of Westernorrland.

Station staff.—C. G. Strokirk, *Dir.;* C. O. Apelgrén, *Asst.*

Origin.—Established in 1883.

Income.—For 1899: Chemical division, $3,262.69 (State, $1,072; contributions from societies, $294.80; county, $254.60; fees for analyses and miscellaneous, $1,239.29; borrowed, $402). Seed control division, $364.77 (State, $120.60; county, $83.75; contributions from societies, $83.75; fees for analyses and miscellaneous, $76.67).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, etc.; seed control. About 1,000 samples were analyzed in the chemical laboratory in 1899. Annual reports are published.

Experiment Station of the Swedish Moor Association, Jönköping.

Governing board.—Under the direction of a committee of the Swedish Moor Association.

Station staff.—Dr. Hj. von Feilitzen, *Dir.;* C. G. L. Reuterskiöld, *Consulting Engineer in Moor Culture;* Rob. Tolf, *Bot. and Geol.;* I. H. Lugner, *Chem.;* C. Johnson, *Asst. for Field and Pot Expts.*

Origin.—Established in 1886.

Equipment.—A building containing chemical and botanical laboratories, museum, library, and offices; experiment garden and equipment

for pot experiments. At Flahurt, 8 miles south of Jönköping, the association has an experiment farm of 308 acres, most of which is moorland. The association also conducts temporary field experiments on about 50 fields in different parts of Sweden.

Income.—For 1902, $13,467 (State, $4,020; provincial agricultural society, $1,634.80; provincial councils, $3,711.80; membership fees, $1,715.20; miscellaneous, including receipts from the sale of literature, $2,385.20).

Lines of work.—Analysis of peat soils; scientific and practical experiments on moorlands, of which there are over 12,000,000 acres in Sweden. The association publishes a bimonthly journal containing the results of its experiments and other articles on the improvement of moorland.

Seed Control Station, Jönköping.

Governing board.—The Agricultural Society of the Province of Jönköping.

Station staff.—R. Tolf, *Dir.;* Lars Tolf, *Asst.*

Origin.—Established in 1882.

Equipment.—Seed control laboratory.

Income.—For 1901, $711 (State, $188; agricultural society, $281; fees and miscellaneous, $242).

Lines of work.—Analysis and control of farm and garden seeds, study of plant diseases.

Chemical Station, Jönköping.

G. Wadner, *Dir.*

Chemical and Seed Control Station, Kalmar.

Governing board.—C. Rappe, A. Lejonhjelm, O. Wilner, C. W. Liedholm, W. A. Bergenholtz.

Station staff.—Dr. Albert Atterberg, *Dir.;* G. Karstrom, *Asst. Seed Control;* C. G. Stålbrand, *Watchman.*

Origin.—Established in 1877.

Equipment.—Chemical and seed control laboratory and a vegetation house.

Income.—For 1901: Chemical division, $4,334.37 (balance from 1900, $144.99; State, $1,072; societies, $1,433.80; fees and miscellaneous, $1,683.58). Seed control division, $848.49 (balance from 1900, $17.69; State, $201; societies, $428.80; fees, $201).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, and technical products, such as indigo, potatoes, corn, malt, etc.; seed control. In 1900 about 2,500 samples were analyzed in the chemical laboratory. Experiments in plant nutrition are conducted partly in pots and partly

in plats. The director has done considerable important work in the classification of varieties of barley and oats, analytical methods and conditions of germination, and mineral constituents of oats. Reports have been published since 1879.

Seed Control Station, Linköping.

Governing board.—A committee of the Agricultural Society of the Province of Linköping.

Station staff.—Wilh. Heyman, *Dir.;* E. Ahl, *Asst.*

Origin.—Founded in 1878 by the Agricultural Society of Linköping; brought under State control in 1887.

Equipment.—A well-equipped seed-testing laboratory, a library, and an experiment field.

Income.—For 1901, $650 (State, $201; agricultural society, $335; fees, $114).

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Experiment Station for Agricultural Chemistry, Vegetable Physiology, and Seed Control, Luleå.

Governing board.—A committee of the Agricultural Society of the Province of Norrbotten.

Station staff.—Dr. Paul Hellström, *Dir.;* Dr. Emil Wickström, *Asst. Chem.;* Ernst Tresk, *Asst. Agr.;* E. Hellström, *Asst. Bot.*

Origin.—Seed control station established in 1889; chemical and physiological division established in 1895.

Equipment.—Three laboratories, a balance room, library, two workrooms, office, and two experiment fields.

Income.—For 1901, $710 (State, $94; agricultural society, $161; provincial council, $67; miscellaneous, including fees and balance from 1900, $388).

Lines of work.—Experiments in the improvement of grasses, clovers, and cereals; variety tests and fertilizer experiments with wheat, oats, potatoes, and other crops; analysis of soils, feeding stuffs, fertilizers, water, etc., and seed control.

Seed Control Station, Lund.

Governing board.—A committee of the Agricultural Society of the Province of Malmöhus.

Station staff.—J. A. Vilke, *Dir., and Controller of Seals;* five workmen.

Origin.—Founded in 1880 by the Agricultural Society of Malmöhus and Prof. B. Jönsson; brought under State control in 1887.

Equipment.—A laboratory in the botanical institute of the university.

Income.—For 1899, $1,165.80 (State, $241.20; contributions from societies, $388.60; fees for analyses, $536).

Lines of work.—Analysis and control of farm and garden seeds.

Seed and Milk Control Station and Chemical Laboratory, Molkom.

Governing board.—A committee of the Agricultural Society of the Province of Wermland.

Station staff.—J. A. Andersson, *Dir.;* C. E. Alven, *Assoc.;* C. W. Nyberg, *Asst. in Chem. and Milk Control;* Kristina Henriksson, *Asst. in Seed Control.*

Origin.—Established in 1892 by J. A. Andersson and the Agricultural Society of the Province of Wermland; brought under State control in 1894.

Equipment.—Three laboratories, office, and balance room.

Income.—For 1901, $1,470 (Seed control, $319; milk control, $179; chemical laboratory, $972).

Lines of work.—Seed and milk control and investigations in agricultural chemistry.

Seed Control Station, Ope, near Östersund.

Governing board.—A committee of the Agricultural Society of the Province of Jemtland.

Station staff.—J. F. Broman, *Dir.*

Income.—Annual grants from the State of $120.60; province, $134; and fees amounting to about $70 per annum.

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Chemical and Seed Control Station, Örebro.

Governing board.—A committee of five appointed by the Agricultural Society of the Province of Örebro.

Station staff.—J. Widén, *Dir.;* J. E. Högbom, Miss K. Larsson, M. Ericsson, *Assts.*

Origin.—Established in 1880.

Equipment.—Chemical and seed control laboratory.

Income.—For 1901: Chemical division, $4,916 (balance from 1900, $2,322; State, $1,123; agricultural society, $536; fees and miscellaneous, $935). Seed control division, $2,110 (balance from 1900, $466; State, $180; agricultural society, $268; fees and miscellaneous, $1,196).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, etc.; seed control. In the seed control division in 1900, 1,254 samples were analyzed and over 19,000 bags of seed were sealed. Annual reports are published.

Chemical and Seed Control Station, Skara.

Governing board.—A committee appointed by the Agricultural Society of the Province of Skaraborg.

Station staff.—Dr. S. Hammar, *Dir.*

Origin.—Established in 1877.

Income.—For 1901: Chemical division, $2,617.31 (balance from 1900, $94.02; State, $1,072; contributions from societies, $536; local contributions, $268; fees for analyses and miscellaneous, $647.29). Seed control division, $287.36 (State, $93.80; contributions from societies, $134; fees for analyses, $59.56).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, etc.; seed control. In the chemical laboratory 6,482 samples were analyzed in 1901. Annual reports are published.

Seed Control Station, Stockholm.

Governing board.—State Department of Agriculture.

Station staff.—Olof Stjernquist, *Dir.;* C. A. Lundén, *First Asst.;* two second assistants.

Origin.—Founded in 1887 by the Royal Agricultural Society of Stockholm with a subsidy from the State Department of Agriculture.

Equipment.—Three laboratories equipped with modern apparatus for seed control and microscopic analysis of feeding stuffs.

Income.—For 1901, $1,370 (subsidies from the Government and the agricultural society, $630; fees, $740).

Lines of work.—Analysis and control of farm and garden seeds; microscopic analysis of feeding stuffs.

Swedish Seed Breeding Station, Svalöf.

Governing board.—Six members appointed by the Swedish Seed Breeding Association, three members appointed by the agricultural societies contributing to the support of the station.

Station staff.—Dr. N. Hjalmar Nilsson, *Dir.;* Drs. Hans Tedin and N. Herman Nilsson-Ehle, *1st Assts.;* J. N. Walldin, G. A. V. Kinberg and A. Elofson (at Ultuna), *Assts.;* clerks; temporary assistants, and helpers.

Origin.—In 1886 the Baron F. G. Gyllenkrook and Birger Welinder organized the South Swedish Seed Breeding Association which soon took the name of the General Swedish Seed Breeding Association, and in 1894, through a union with the Middle Swedish Seed Breeding Association, became the present Swedish Seed Breeding Association. Experiments in seed breeding began with the organization of the society in 1886, and was brought under the control of the State in 1890.

Equipment.—At Svalöf the association owns about 37 acres of land, one-third of which is occupied by buildings and a park containing

plats for perennial legumes and for various experiments, and two-thirds are devoted to the cultivation and increase of improved varieties of seeds. The buildings include a residence and laboratory building containing two storerooms for plants, three rooms for the selection of parent plants and the examination of the progeny to determine its constancy, three rooms for collections and the inspection of seed, two rooms for chemical work and seed control, a photographic room, etc.; a barn and a collection of instruments used in breeding work, many of which were devised by the station staff. Among other such pieces of apparatus are instruments for classifying grain according to the density of the head and the strength of straw, an automatic balance for selecting heads of grain, a cribbing machine for grading seed, and an instrument for taking the dimensions of leguminous seeds. Seeds for the northern part of the country are tested on the experiment field at the Agricultural Academy, Albano, by a special station assistant. Temporary experiments are conducted on private fields all over the country.

Income.—For 1901, $14,000, including a State grant of $4,824; from agricultural societies, $4,596; membership fees, $680.72; royalty for improved products, $670, etc.

Lines of work.—The objects of the association are to improve the quality of seed used in the country and raise the standard of cultivation and thus develop an export trade in seed. This is accomplished mainly through the breeding of new varieties and by using a method of selection elaborated at the station and known as the "Svalöf method." In this work the institution has been very successful, having developed about 20 new varieties and brought them into practical use. For the purpose of keeping these varieties pure and maintaining their productiveness the General Swedish Seed Company, Limited (capital, $125,000), was organized in 1891. This company has no official connection with the Swedish Seed Breeding Station except as to the quality of seed it handles. At present the company handles no seed except that bred at the station.

Seed Control Station, Upsala.

Governing board.—A committee appointed by the Agricultural Society of the Province of Upsala.

Station staff.—Tom von Post, *Dir.*

Income.—For 1900, $600 (State, $134; agricultural society, $335; fees, $131).

Lines of work.—Seed control—testing of seeds for purity, weight, water content, dry material, germination, etc.

Chemical and Seed Control Station, Westerås.

Governing board.—A committee of the Agricultural Society of the Province of Westmanland.

Station staff.—Dr. J. O. Bergstrand, *Dir.;* K. Högvall, B. A., *Asst.*

Income.—For 1899: Chemical division, $2,584.59 (balance from 1898, $193.19; State, $1,072; contributions from societies, $634.90; fees for analyses and miscellaneous, $684.50). Seed control division, $424.63 (State, $120.60; contributions from societies, $133.72; fees for analyses, $170.31).

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, food and condiments, poisons, etc.; seed control.

Chemical and Seed Control Station, Wisby.

Governing board.—A committee appointed by the Agricultural Society of the Province of Gothland.

Station staff.—O. Hulander, *Dir.;* A. G. Palmquist, *Asst.*

Origin.—Established in 1899 by the State Department of Agriculture.

Income.—For 1900, $804 from the Government.

Lines of work.—Analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, etc.; seed control.

Institution for Local Manuring Experiments, Wisby.

Governing board.—R. T. Hennings, I. Insulander, Prof. H. G. Söderbaum, Prof. J. Eriksson, and P. Bolin.

Station staff.—P. Bolin, *Dir.;* A. Österman, *Asst.*

Origin.—Organized in 1900 by the Royal Academy of Agriculture.

Equipment.—A central station for the distribution of fertilizers, examination of crops, and publishing of the report.

Income.—For 1902, $4,050 (State, $1,350; provincial agricultural societies, $2,700).

Lines of work.—Field experiments for ascertaining which artificial fertilizers are appropriate to different soils and plants.

Agricultural Chemical Stations of Agricultural Societies.

Ten county agricultural societies have for a number of years made arrangements with the chemical departments of certain agricultural schools to have chemical analyses made for farmers in their respective counties at a low rate, and for this purpose have set apart definite sums of money annually. The location of these stations and the director of each are as follows: Alnarp, Dr. M. Weibull; Borås, Dr. W. Abenius; Gefle, Dr. K. Arnell; Göteborg, J. E. Alén; Helsingborg, K. E. Bexelius (receives appropriation from the State); Christianstad, F. Johannesson; Molkom, J. A. Andersson; Ultuna, E. Pettersson; Umeå, Dr. C. N. Pahl; and Wisby, L. A. Zetterling.

Lines of work.—The work of these stations includes the analysis of soils, fertilizers, feeding stuffs, water, milk and dairy products, foods and condiments, poisons, and a few miscellaneous articles.

SWITZERLAND.

Department of Commerce, Industry, and Agriculture, Bern.

Dr. A. Deucher, *Minis. of Com., Indus., and Agr.;* Dr. Arnold Eichmann, *Chief Div. of Com.;* Dr. Franz Kaufmann, *Chief Div. of Indus.;* Franz Müller, *Chief Div. of Agr.*

In Switzerland the Federal agricultural experiment stations are established by the Government and controlled by the Department of Agriculture. The directors and other officers of the stations are appointed by the Federal Council (corresponding closely to the President's Cabinet in the United States) upon recommendation by the Department of Agriculture. Reports of the investigations conducted at the different stations are published by the department in bulletin form in both German and French. From eight to twelve of these bulletins are published in a year, and together they make up a volume, the German edition of which is called *Landwirtschaftliches Jahrbuch der Schweiz*, and the French edition, *Annuaire Agricole de la Suisse.*

Agricultural Chemical Station, Lausanne.

Governing board.—Department of Agriculture.

Station staff.—Dr. C. Dusserre, *Dir.;* two assistant chemists; one helper.

Origin.—Established in 1895.

Equipment.—Chemical laboratory, vineyard, and experiment field.

Income.—Supported by the Government. Expenditures for 1901, $3,205.

Lines of work.—Analysis and control of fertilizers, concentrated feeding stuffs, and remedies for plant diseases and pests; instructions to the public regarding the purchase and use of these articles; and field and laboratory experiments. The field work includes experiments with different commercial fertilizers and with spraying solutions for plant diseases and for killing weeds. These experiments are conducted in 15 fields in different parts of the country and in 4 vineyards recently established for the purpose. The laboratory work, aside from control analyses, includes analysis of hays, potatoes, beets, mushrooms, cereals, and other miscellaneous articles.

Viticultural Station, Lausanne.

Governing board.—The Grand Council of the Canton de Vaud.

Station staff.—Prof. E. Chuard, *Dir.;* Dr. H. Faes, *Adjunct Physiol.;* Dr. F. Porchet, *Adjunct Chem.;* two laboratory helpers, a

meteorological observer, a librarian and curator of the museum, gardeners, and other helpers.

Origin.—Established in 1887.

Equipment.—A laboratory of physiology and microscopy with adjoining vegetation houses, a laboratory cellar for studies in wine making, a chemical laboratory, a meteorological observatory, museums, collections, etc.

Income.—Supported in part by the Canton de Vaud and in part by the Federal Government.

Lines of work.—Viticultural investigations, including experiments with American phylloxera-resistant vines and with soils, fertilizers, insecticides, and fungicides; study of diseases of the vine; chemical investigation of vines, grapes, must, wines, soils, fertilizers, waters, and agricultural products. Reports of the work are published in *Chronique agricole du canton de Vaud.*

Dairy Station, Lausanne.

Staff.—C. Pelichet, *Dir.*

Origin.—Opened in 1889.

Equipment.—Experimental dairy.

Lines of work.—Dairy investigations.

Seed Control Station, Lausanne.

Governing board.—Department of Agriculture.

Station staff.—Prof. G. Martinet, *Dir.;* four assistants.

Origin.—Opened in 1898.

Equipment.—Three laboratories; two vegetation houses; two experiment fields, one at Mont Calme and the other at Bullet.

Income.—Supported by the Government. Expenditures for 1901, $2,856.

Lines of work.—Analysis and control of seeds, field tests of varieties of potatoes and cereals, cooperative experiment with pasture grasses, experiments with legumes for green manuring, hybridization of potatoes, and experiments with grains at different altitudes. Considerable attention is given to investigations in plant protection and plant diseases.

Agricultural Chemical Experiment Station, Liebefeld, near Bern.

Governing board.—Department of Agriculture.

Station staff.—Dr. Paul Liechti, *Dir.;* Dr. W. Moser, *1st Asst.;* E. Shütz, Ed. Weissmüller, E. C. Weissmüller, Dr. E. Jacky, Doctor Heuberger, Dr. E. Ritter, A. Jäggli, E. Truninger, *Assts.;* secretary; clerk; gardeners, and helpers.

Origin.—Founded in 1891 as an institute of the University of Bern; brought under State control in 1897.

Equipment.—Seven well-equipped laboratories, with six storerooms; a vegetation house containing 600 vegetation pots, a laboratory, and several workrooms and storerooms; experiment fields.

Income.—Supported by the Government. Expenditures in 1901, $14,022.

Lines of work.—Control of fertilizers and feeding stuffs, investigations in plant nutrition and soils, vegetation experiments, and analytical work.

Bacteriological Laboratory of the Swiss Agricultural Experiment Stations, Liebefeld, near Bern.

Governing board.—Department of Agriculture.

Station staff.—Dr. E. von Freudenreich, *Dir.;* J. Hohl, *1st Asst.;* G. Thöni, *2d Asst.*

Origin.—Established in 1900.

Equipment.—The bacteriological laboratory is located in the new agricultural experiment station building, completed in 1901, and is provided with an office, library, and private laboratory for the director, a large laboratory for the assistants, a special chemical laboratory, a balance room, sterilizing room, operating room, two incubator rooms, a room for animals, photographic room, etc.

Income.—Supported by the Government. Expenditures for 1901, $4,086.

Lines of work.—Bacteriological investigations with special reference to the rôle of bacteria in dairying and cheese making. The director is author of "Bacteriology in the Dairy," a short, popular treatise for dairy schools, cheese makers, and farmers, and has made investigations on the part played by lactic-acid bacteria in the ripening of cheese, action of rennet ferment, use of artificial rennet in cheese making, bacteria of kephir, influence of electricity on bacteria, influence of temperature on the bacteria in milk and cheese, and of food on the bacteria content of cow dung, the poisonous nature of culture products of animal tuberculosis, and other similar problems.

Dairy Experiment Station, Liebefeld, near Bern.

Governing board.—Department of Agriculture.

Station staff.—Orla Jensen, *V.-Dir.;* Doctor Steinegger, *Asst.*

Origin.—Established in 1902.

Equipment.—The dairy station is provided with quarters in the new agricultural experiment station building, including office, library, and private laboratory for the director, a large laboratory, balance room, three special laboratories, photographic room, etc. Special cheese and butter rooms with curing rooms have been constructed.

Lines of work.—Experiments and investigations in dairying and cheese making

Dairy School and Experiment Station, Rütti-Zollikofen.

Governing board.—A cantonal committee of six members: C. Hofer, *Pres.;* A. Roth, *Sec.*

Station staff.—A. Peter, *Dir. and Dairy Bact.;* Fritz Müller, *Form. Butter Making;* Jakob Held, *Cheese Making;* Johannes Andres, *Bookkeeping, Penmanship, and Accounts;* Guido Köstler, *Chem.;* Werner Kummer, *Asst. Chem. Milk Testing.*

Origin.—Established in 1887.

Equipment.—School building containing chemical, bacteriological, and other laboratories used in experimental work, experimental cheese factory, and experimental dairy.

Income.—Maintained jointly by the Federal and cantonal governments at an annual expense of about $6,000.

Lines of work.—Instruction in dairying; investigations for the purpose of protecting and controlling the local cheese and dairy business; testing of dairy apparatus, machinery, and materials; scientific experiments in lines connected with dairying, especially in dairy chemistry and bacteriology.

Experiment Station and School for Fruit, Wine, and Garden Culture, Wädensweil.

Governing board.—An intercantonal commission of twenty-one members: A. Locer (*Pres.*), *Winterthur;* J. C. Eschmann (*Sec.*), *Zürich.*

Station staff.—Dr. H. Müller-Thurgau, *Dir. and Plant Physiol.;* W. Kelhofer, *Chem.;* M. Löbler, *Gard.;* H. Schellenberg, *Hort. and Vit.;* Th. Zschokke, *in charge of Expts. with Fruit Products;* Dr. J. Hofer, *Zool.;* Dr. A. Osterwalder, *Asst. in Lab. for Plant Physiol. and Fermentations;* A. Kitt, *Bookkeeper and Corresp. Clerk;* helpers, assistants, etc.

Origin.—Established in 1891.

Equipment.—Laboratory for plant physiology; chemical laboratory; accommodations for the divisions of ferments and pure-yeast cultures, zoology, and fruit products; experimental gardens, orchards, vineyards, fruit and wine cellars, and press rooms; forcing house, and meteorological observatory.

Income.—Maintained jointly by Federal and cantonal governments at an annual expense of about $15,000.

Lines of work.—The investigations of the station include a wide range of subjects, all more or less directly connected with the production and manufacture of fruits and vegetables. Among them might be mentioned experiments in the manufacture of cider, perry, and dried and preserved fruits and vegetables; investigation of root systems, and of the relation of seed development to production of grapes and some other fruits; vineyard, orchard, and cellar experiments, including methods of pruning, uses of fertilizers, trellising, effect of loss of leaves by hailstorms, influence of cultivating crops between

rows of vines or fruit trees, prevention of frost, combating downy mildew and other diseases of the vine, improvement of grapes, experiments in wine manufacture and handling; fertilizer and other experiments in vegetable and flower gardens and forcing house; chemical investigation of fertilizers, spraying materials, and fruit products; study of plant diseases and means for combating them; bacteriological investigation of wines, yeasts, etc., and meteorological observations.

Agricultural Chemical Experiment Station, Zürich.

Governing board.—Department of Agriculture.

Station staff.—Dr. E. A. Grete, *Dir.;* chemist, botanist, secretary, and six assistant chemists; six other permanent employees and about as many temporary assistants.

Origin.—Established in 1878 by the Polytechnic School of Zürich; brought under control of the Department of Agriculture in 1898.

Equipment.—The station has quarters on the first floor and in the basement of the Federal chemical building. Here are found the director's office and private laboratory, a dark room, rooms for collections and chemical apparatus, laboratory for the determination of water-soluble phosphoric acid, large general laboratory, laboratory for potash determinations, wash rooms, offices, storerooms, etc.

Income.—For 1901, $10,718, derived from State subsidy and fees for analyses.

Lines of work.—Analysis and control of fertilizers and feeding stuffs; analysis of soils, milk, marls, manures, sugar beets, and other miscellaneous articles; field experiments in plant protection and soil investigations with lime.

Experiment Station for Brewing, Zürich.

Governing board.—This station is the property of an association which includes in its membership nearly all the breweries in Switzerland and a number of malt houses both in Switzerland and in other countries.

Station staff.—L. Fries, *Dir.;* A. Winkelmann, M. Diener, J. Ucker, *Assts.;* several clerks and helpers.

Origin.—Founded in 1890 by the Association of Brewers.

Equipment.—Two chemical laboratory rooms, a room for microscopic and biological work, a balance room, two offices, and a cellar for the production of pure yeasts.

Income.—The funds for the support of the station are derived from initiation fees and annual dues of members, fees for investigations, and receipts from the sale of instruments and pure yeasts.

Lines of work.—Investigation of the by-products and other materials used in the brewing industry; control of instruments; the production of pure yeasts; furnishing expert advice in matters relating to brewing.

Seed Control Station, Zürich.

Governing board.—The Department of Agriculture.

Station staff.—Dr. F. G. Stebler, *Dir.;* Eugène Thiele, *First Asst.;* A. Volkart, *Asst. Bot.;* other assistants and a clerk.

Origin.—Established in 1878.

Equipment.—Laboratory, greenhouse for germination experiments, small experiment field for culture tests, experiment field for forage plants at Wollishofen, and experiment field for alpine culture on the Fürstenalp at Graubünden, and temporary experiment fields in all parts of Switzerland.

Income.—For 1901, $8,640 (State, $4,574; fees, $4,066).

Lines of work.—Analysis and control of seeds. During the year ended June 30, 1901, 10,257 samples were sent in for analysis and the individual investigations numbered nearly 24,000. Lists of control firms are published for the benefit of purchasers of seeds. The other work of the station includes the investigation of forage plants, culture tests, experiments for the improvement of meadows and pastures in the valleys and on the mountain sides.

TRANSVAAL.

Transvaal Department of Agriculture, Pretoria.

Staff.—F. B. Smith, *Dir.;* A. C. McDonald, *Asst. Dir.;* A. Theiler, *Vet. Sci.* (*Bact.*); Stewart Stockman, *Vet. Sci.;* Herbert Ingle, *Chem.;* J. Burtt Davy, *Bot.;* J. A. Kinsella, *Dairying;* C. B. Simpson, *Ent.;* R. A. Davis, *Hort.;* Chas. L. Legat, *Asst. For.;* Wm. MacDonald, *Div. of Publications;* Reginald Bourlay, *Poultry Management.*

Origin.—Established in 1903.

Lines of work.—This department is both an administrative and advisory department and the scope of its work will include studies and investigations upon various problems connected with agriculture, such as animal and plant diseases, injurious insects, soils, the use of fertilizers, irrigation, breeding, poultry farming, dairying, etc. The official publication of the department is the *Transvaal Agricultural Journal*, which is issued quarterly.

TUNIS.

Department of Agriculture and Commerce.

Hugon, *Dir.*

An agricultural service was organized as early as 1870, before the date of the French protectorate, and existed in various forms, united with various other organizations, until expanded into the Department of Agriculture and Commerce in 1896. As at present constituted the department comprises the agricultural service, including the trial garden, agricultural school, chemical laboratory, wine making and bacteriological laboratory, and inspection of breeding animals, diseased

vines, etc.; the service of commerce, industry, and weights and measures; domains; colonization; forests, and olive plantations.

Colonial Agricultural School, Tunis.

Governing board.—Department of Agriculture and Commerce. Hugon, *Dir.*

Staff.—Lepiney, *Dir.*

Equipment.—School building, botanical laboratory, museum, barns, and farm.

Income.—Supported by the State.

Lines of work.—Cultural and fertilizer experiments with cereals, root crops, forage crops, and fruits; variety tests, selection, and hybridization. Reports of the work are published in the official bulletin of the Department of Agriculture and in separate reports.

Chemical Laboratory and Experiment Station, Tunis.

Governing board.—The Department of Agriculture and Commerce.

Station staff.—E. Bertainchaud, *Dir.;* Marcille, *Chem.;* Laverdet, *Asst. Chem.*

Origin.—A chemical laboratory was established in 1887.

Lines of work.—Investigations on the adulteration of food and medicinal products; analysis of soils, waters, manures, feeding stuffs, chemical analyses for government officials; cultural experiments with cereals, forage crops, food plants, and other economic plants; fertilizer and rotation experiments; variety tests; microscopic investigations; experiments in manufacturing, improving, and preserving olive oil.

Trial Garden, Tunis.[a]

Governing board.—Department of Agriculture and Commerce.

Station staff.—L. Guillochon, *Dir.;* Grandicha, *Head Gard.*

Origin.—Established in 1892.

Equipment.—Propagating house, two greenhouses, a glass house for wintering delicate plants, palm garden.

Income.—For 1902, $7,720 (government subsidy, $5,404; private contributions, $1,930; miscellaneous, $386).

Lines of work.—Introduction, acclimatization, and cultivation of economic and ornamental plants, and distribution of those suited to the climate.

Wine Making and Bacteriological Laboratory, Tunis.

Governing board.—Department of Agriculture and Commerce.

Origin.—Established in 1894.

Lines of work.—Study of diseases of animals, preparation of vaccine, study of fermentation and processes of wine making, and manufacture of pure yeasts.

[a] See Colonial Garden, Nogent-sur-Marne, France, p. 111.

INDEX OF NAMES.

U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 112 (Revised).

A. C. TRUE, Director.

AGRICULTURAL EXPERIMENT STATIONS

IN

FOREIGN COUNTRIES.

BY

A. C. TRUE and DICK J. CROSBY.

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1904.

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[a] Director. [b] Assistant director. [c] Special agent in charge. [d] Acting director.